

ADDENDUM TO THE ENERGY STATEMENT

REPORT NOTES

DATE PROJECT NAME PREPARED BY

30/11/2017 Arthur Stanley House Paolo Balice

NOTES: Addendum to be read in conjunction with the Energy Statement issued on the 20/07/2017 by SRA.

EXECUTIVE SUMMURY

An Addendum to the existing Energy Statement has been prepared for the residential part of the development at Arthur Stanley House; this establishes how it will achieve compliance with the Building Regulation requirements as illustrated in the Approved Document L1A (ADL1A) and with local authority requirements as set in the New Camden Local Plan 2017. This has been achieved by following best practice procedures of the London Plan's Energy Hierarchy: be lean (improved building performance); be clean (centralised heating and cooling systems); and be green (use of low or zero carbon technologies). It has been assessed that the development will comply with the Building Regulations requirements in terms of carbon emissions achieving a 16.5% improvement over a Part L 2013 compliant building. This result does not meet the local authority target sets out at 19% improvement trigging a carbon offset payment of £720. Moreover, for the apartments not provided with comfort cooling, an overheating assessment based on the Technical Memorandum issued by CIBSE has been carried out showing that these areas will not be prone to overheating during summer.

PROJECT DESCRIPTION

The existing site consists of a vacant former hospital building which will be refurbished for commercial and residential uses with a rear extension added. The proposal will involve the redevelopment and refurbishment of Arthur Stanley House to include flexible office spaces alongside ten private dwellings of which two will be affordable (duplex on lower and ground floor) and the remaining eight will be privately sold. The proposed scheme seeks to:

1) Refurbish the existing building; 2) Extend the floorplates to the rear of the building; 3) Create a high quality environment suitable for Fitzrovia occupiers over small floorplates ranging from approximately 3,200 to 6,400 square feet; 4) Develop a residential block on the Mews with warehouse aesthetics and loft style flats.

BUILDING REGUALTION BACKGROUND

The new residential development will need to follow the prescriptions illustrated in the Approved Document L1A – Conservation of Fuel and Power and in particular it will need to comply with the three criteria:

1. Carbon emissions

The headline emissions target is achieved using the DER/TER figures. CO₂ emissions are measured by comparing a Target Emission Rate (TER) against the predicted Dwelling Emission Rate (DER). This target rate is set within SAP by reference to a notional dwelling of the same size and shape, using a set of baseline values.

2. Fabric Energy Efficiency

Homes built after April 2014 in England are also assessed on Fabric Energy Efficiency. This is not a measure of carbon, but energy demand in units of kilowatt-hours per m² per year. Fabric Energy Efficiency is assessed using DFEE/TFEE figures. As with emissions the target is set within SAP using a set of baseline values depending on the size of the property.

3. Limiting heat gains during summer

Heat gains should be limited as much as possible during summer months as they make the spaces prone to overheating and therefore uncomfortable for theirs occupants. The SAP calculation methodology, by which compliance under PartL1A is assessed, also gives an estimate of the likelihood of overheating risk within the dwellings. Besides having a high level of passive design features which will minimise the heat gains, the privately sold apartments in the development will be provided with comfort cooling as well effectively nullifying the risk of overheating. The two affordable duplex have been assessed against the higher standard of overheating risk assessment CIBSE TM52 and TM59 which shows that the apartments are complaint and therefore their occupants will experience thermal comfort.

In addition to the requirements set out in ADL1A, the development is located in the London Borough of Camden which requires further improvements over the standard Building Regulations. In July 2017 the Borough has issued and adopted a new Local Plan where energy and carbon reduction targets are illustrated. In particular, Policy CC1 - Climate change mitigation sets out that "the Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation". The council follows the London Plan Energy Hierarchy (be lean, be clean, be green) to achieve the carbon emissions reduction targets. Paragraph 8.8 of the Camden Local Plan states that "all developments involving five or more dwellings and/or more than 500 sqm of (gross internal) any floor space will be required to submit an energy statement demonstrating how the energy hierarchy has been applied to make the fullest contribution to CO_2 reduction. All new residential development will also be required to demonstrate a 19% CO_2 reduction below Part L 2013 Building Regulations (in addition to any requirements for renewable energy)".

In light of this policy, the development is targeting the maximum possible achievable carbon emission reduction considering that physical constrains such as limited roof space will make difficult to use of PV panels.

PART L1A AND ENERGY HIERARCHY

The Standard Assessment Procedure (SAP) is the Government's recommended system for the energy rating of residential dwellings. It is a tool which enables energy assessors to calculate the energy demand and the CO2 emissions of a dwelling. The energy demand calculated using the SAP methodology is relative to the Regulated Emissions which include the energy consumed to power space heating, domestic hot water, ventilation and internal lighting systems. The unregulated emissions (i.e. cooking and appliances) are calculated using BREDEM (BRE Domestic Energy Model). For the purposes of this strategy, a SAP assessment was carried out on each dwelling type present within the development in order to identify each dwelling's potential CO₂ emissions.

Baseline scenario (Part L1A compliant development)

The baseline scenario assumes the minimum values required to meet Building Regulation 2013 Part L1A. This scenario includes all insulation levels, ventilation and building services which are set at the minimum to comply with Approved Document Part L1A and the Domestic Building Services Compliance Guide 2013. The modelling undertaken identified the total CO_2 emissions across the site as $16,070 \text{ kg}CO_2/\text{year}$.

Be Lean

Energy demand reduction within the building can be utilised to improve compliance with Part L 2013. This development has been reviewed to maximise both passive and active design measures to reduce the energy demand within the building. To reduce the CO_2 emissions of the development it is important to minimise the heat losses through the building fabric. In order to achieve this, U-values for all building fabric elements and openings have been specified to exceed the levels required by Building Regulations. In addition, heat losses from infiltration have been minimised and a low air permeability target has been set. The details of these measures are summarised in the table below.

Thermal Elements	U-value [W/m²K]
External Wall – Unheated spaces	0.15
Ground floor – Exposed Floor	0.11
Roof	0.15
Windows - Doors	1.2 (G value 0.24)
Air permeability	3 m ³ /hm ²
Thermal Bridging	Accredited Construction Details

Table 1 - Proposed U values

In addition to upgrading the insulation standards, it is important that the energy used within the building is efficient. To achieve this, energy efficient heating services have been specified with a very efficient heating control system (time and temperature zone control). Also, a high efficient split system (EER 3.5 class A) has been selected for the dwellings provided with comfort cooling.

The air quality within a dwelling is significantly influenced by the ventilation system specified. To ensure high air quality within the dwelling(s), an efficient centralised whole house extract system has been specified, with low specific fan power. Electrical lighting also represents a significant energy use within a building. To maximise energy savings the installation of low energy lighting across the development has been specified.

The modelling undertaken identified that total site wide carbon dioxide emissions, after the inclusion of improved fabric and building systems (i.e. lean measures) are estimated as $15,430 \, \text{kgCO}_2/\text{yr}$. This is a reduction of $600 \, \text{kgCO}_2/\text{year}$ compared to the baseline scenario, which equates a saving of 3.98% on regulated emissions.

Be Clean

Please refer to the Energy Statement issued by SRE on the 20th of July 2017 for the district heating feasibility study.

A gas fired CHP system was deemed to be feasible for the whole development which includes also various use offices. Within the development, the long operating hours required by the CHP will be

ensured by the hot water demand, which will be constant throughout the year. As a result, the installation of a gas CHP plant to meet the heat demands year round was investigated and it was assessed that the best strategy to provide the residential part of the development with heating and DHW is the use of a gas fired CHP coupled with a gas fired boiler.

The modelling undertaken identified that total site wide carbon dioxide emissions, after the inclusion of a CHP system are estimated as $14,280 \text{ kgCO}_2/\text{yr}$. This is a reduction of $1,200 \text{ kgCO}_2/\text{year}$ compared to the "be lean" scenario, which equates to a saving of 7.16%.

Be Green

This section discusses the feasibility of using low and zero carbon (LZC) technologies for the proposed scheme. The London Plan, which the London Borough of Camden comes under, aspires that all major developments reduce their carbon dioxide emissions by at least 20% through the use of on-site renewable energy generation, where feasible. After taking into consideration a number of different factors, including local authority requirements, land use, potential noise impacts and available space within the development it was concluded that the best strategy for this development is the installation of 2.7 kWp (in total) of photovoltaic panels. These need to be located on the roof of each building, at 30°, facing south. Upon consideration of the LZC technology, the modelling identifies that a further reduction of circa 900 kgCO₂/year has been achieved for the carbon emissions taking the overall regulated emissions for the development at 13,420 KgCO₂/year. This means that a reduction of 5.35 % has been achieved when compared to the "be clean" scenario.

Results

As requested by the Greater London Authority guidance on preparing energy assessments, the following tables and graphs illustrate the results of the SAP assessment.

Feature	U-value [W/m²K]
Mechanical Ventilation with heat recovery	1 wet zone flat - SFP of 0.42, 90% efficiency; 2 wet zones flat - SFP of 0.54, 90% efficiency
Heating and DHW System	CHP η_{heat} =0.63; η_{elec} =0.306: Gas boilers η =0.96
Cooling System	A class and EER 3.5
Lighting	100% high efficiency fittings
LZC technologies	2.7kWp Monocrystalline panels

Table 2 HVAC system main featured

Carbon Dioxide Emissions (Tonnes CO2 per annum)										
Regulated Unregulated Total										
Baseline: Building regulations 2013 Part L Compliant Development	16.07	10.87	26.94							
After energy demand reduction	15.43	10.87	26.30							
After CHP	14.28	10.87	25.15							
After Renewable energy	13.42	10.87	24.29							

Table 3 Energy Hierarchy Carbon Emissions

	Regulated Carbon	Dioxide savings
	[Tonnes CO2 per annum]	[%]
Savings from energy demand reduction	0.64	3.98%
Savings from CHP	1.15	7.16%
Savings from renewable energy	0.86	5.35%
Total cumulative savings	2.65	16.49%

	Annual Shortfall [Tonnes CO2]	Cumulative shortfall [Tonnes CO2]
Total target savings	3.05	
Shortfall	0.40	12.0

Table 4 Energy Hierarchy Carbon Savings

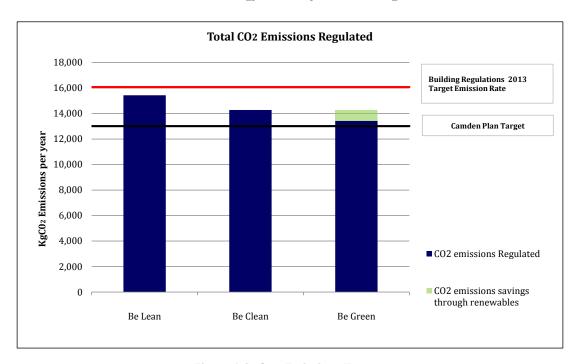


Figure 1 Carbon Emissions Targets

As illustrated above, the development fails to achieve the 19% target improvement over PartL2013 and the shortfall equates to $400~\rm KgCO_2/\rm year$. Considering a carbon offset payment of £1,800 per ton this will equate to final payment of £720. However the New Camden Local Plan issued in July 2017 does not contain any figures in terms of carbon offset payment so the previous figure of £1,800 per ton of carbon has been used for the calculation of the carbon off-set payment.

OVERHEATING ASSESSEMENT

The duplex apartments located on the basement and ground floor will not be provided with comfort cooling therefore to design out the overheating risk for those areas, a dynamic simulation approach was used to assess whether the dwellings will be prone to overheating. The dwellings have been assessed against the guidelines contained in CIBSE TM59. This is a standardised approach to predict overheating risk for residential building designs using dynamic thermal analysis. The document provides some guidelines to standardise this type of studies and create a consistent approach which can be used across the industry. The bases of CIBSE TM59 are still rooted in the adaptive thermal comfort framework developed in CIBSE TM52 and in CIBSE Guide A which includes advice regarding sleeping quality in terms of bedroom operative temperature.

As illustrated in the results contained in APPENDIX B, the areas assessed will not be prone to overheating during summer months.

CONCLUSIONS

As shown in the previous paragraphs, the development has targeted the maximum level of carbon emissions reduction achievable. The development will achieve a 16.5% reduction over the target emission rate with a shortfall of $400~\text{KgCO}_2/\text{year}$; this will equate to an offset payment of £720 (based on the previously used figure for Camden Borough of £1,800 Tons of CO_2). Moreover, an overheating analysis was carried out for the duplex apartments which showed that these areas will not be prone to overheating during summer months.

APPENDIX A – SAP CALCULATIONS

			User I	Details:						
Assessor Name:	Chris Hock	nell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FS	AP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
			Property	Address	: Flat 0-	1-Lean				
Address :										
1. Overall dwelling dime	ensions:		Λ να	a(m2)		Av. Hai	iaht/m)		Valuma/m³	`
Basement				ea(m²) 43.25	(1a) x		ight(m) 3.1	(2a) =	Volume(m³)) (3a)
Ground floor				63.89	(1b) x	2	2.6	(2b) =	166.11	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n) -	107.14	(4)			_		
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:										
	main	second heating		other		total			m³ per hou	r
Number of chimneys	heating 0	+ 0	y + [0	-	0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	-	0	Ī = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns					4	x -	10 =	40	(7a)
Number of passive vents	;					0	x -	10 =	0	(7b)
Number of flueless gas fi	res				Ī	0	X 4	40 =	0	(7c)
					_					
					_				anges per ho	our —
Infiltration due to chimne If a pressurisation test has be	•				oontinus fr	40		÷ (5) =	0.13	(8)
Number of storeys in the		• •	eea 10 (17),	otrierwise	conunue ii	OIII (9) 10 (16)		0	(9)
Additional infiltration	no awoming (no	,					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or	timber frame	or 0.35 fc	r mason	rv constr	ruction	1(0)	.,	0	(11)
if both types of wall are p	resent, use the val	ue corresponding			•				Ŭ	(、、,
deducting areas of openial If suspended wooden to	• / .		0.1 (coal	ad) also	ontor O					7(40)
If no draught lobby, en		` ,	U. I (Seal	eu), eise	enter 0				0	(12)
Percentage of windows	·		ı						0	(13)
Window infiltration	s and doors die	augiii siripped	ı	0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate				_		12) + (13) -	+ (15) =		0	(16)
Air permeability value,	a50 expresse	d in cubic met	res per h					area	5	(17)
If based on air permeabil	•		•	•	•	.00 0. 0	птогоро	a.oa	0.38	(18)
Air permeability value applie	•					is being us	sed		0.30	(.0)
Number of sides sheltere	ed								2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorporate	ting shelter fac	tor		(21) = (18	s) x (20) =				0.33	(21)
Infiltration rate modified f	or monthly win	d speed								_
Jan Feb	Mar Apr	May Jur	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table	 e 7								
(22) = 5.4 5	40 44	42 20	1 20	1 27	1 4	1.2	1 4 5	4 7	l	

4.3

3.8

3.8

3.7

4.5

4.7

Wind Factor (22a)m = (22)m	÷ 4								
(22a)m= 1.27 1.25 1.23	1.1 1.08	0.95	0.95 0.92	1	1.08	1.12	1.18		
A division of infiltration rate (all a			\ (0.4 - \ - \ -	(00-)				ı	
Adjusted infiltration rate (allowable) 0.42	0.36 0.35		$\frac{\text{eed}}{0.31} = \frac{(21a) \text{ X}}{0.3}$	(22a)m 0.33	0.35	0.37	0.38		
Calculate effective air change		1 1		0.33	0.55	0.37	0.36		
If mechanical ventilation:								0	(23a)
If exhaust air heat pump using Ap) = (23a)			0	(23b)
If balanced with heat recovery: ef	•	-	,	•				0	(23c)
a) If balanced mechanical		 	· · · · · ·	í `	 		``	÷ 100] I	(0.4-)
(24a)m= 0 0 0	0 0	0	0 0	0	0 (0	0		(24a)
b) If balanced mechanical (24b)m= 0 0 0	ventilation without the or	ut heat recov	very (MV) (24k 0 0	0) m = (22)	2b)m + (2	•	0	1	(24b)
(1,					0	0	U		(240)
c) If whole house extract void if (22b)m < 0.5 x (23b)	•	•			.5 × (23b)			
(24c)m = 0 0 0	0 0	0	0 0	0	0	0	0		(24c)
d) If natural ventilation or w	hole house pos	tive input ve	entilation from	loft			ļ.		
if (22b)m = 1, then (24					0.5]			•	
(24d)m= 0.59 0.58 0.58	0.56 0.56	0.55	0.55 0.55	0.55	0.56	0.57	0.57		(24d)
Effective air change rate -	 			x (25)	1			1	
(25)m= 0.59 0.58 0.58	0.56 0.56	0.55	0.55 0.55	0.55	0.56	0.57	0.57		(25)
3. Heat losses and heat loss	parameter:								
3. Heat losses and heat loss ELEMENT Gross area (m²)	parameter: Openings m²	Net Area A ,m²			A X U (W/ł	<)	k-value kJ/m²-ł		X k /K
ELEMENT Gross	Openings					<) 			
ELEMENT Gross area (m²)	Openings	A ,m²	2 W/m2	2K = [(W/ł	<) 			/K
ELEMENT Gross area (m²) Doors	Openings	A ,m²	W/m2 × 1.2	2K = [- 0.04] = [(W/k	<) 			/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,m ² 2.6 10.39	W/m2 x 1.2 x1/[1/(1.4)+	2K = [-0.04] = [-0.04] = [3.12 13.77	<) 			(26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	A ,m ² 2.6 10.39 2.1	W/m2 x 1.2 x1/[1/(1.4)+ x1/[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	3.12 13.77 2.78	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,m ² 2.6 10.39 2.1 3.2	W/m2 x 1.2 x1/[1/(1.4)+ x1/[1/(1.4)+ x1/[1/(1.4)+		(W/k 3.12 13.77 2.78 4.24	<)			(K) (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	A ,m ² 2.6 10.39 2.1 3.2 5.8	W/m ² x 1.2 x1/[1/(1.4)+ x1/[1/(1.4)+ x1/[1/(1.4)+ x1/[1/(1.4)+		(W/k 3.12 13.77 2.78 4.24 7.69	<)			(K) (26) (27) (27) (27) (27)
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Party of	eilina					59.06					Г		-	(32b)
-	•	roof wind	ows, use e	effective wi	indow U-va			ı formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph	3.2	(02.5)
					ls and part		J		- ,	,	ŭ	, , ,		
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				73.91	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	35629.15	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) in	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•				constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
			tailed calcu x V) cal		using Ap	nendiy k	<i>(</i>					i	24.54	(36)
	•	,	,		= 0.15 x (3	•	`					l	31.54	(30)
	abric he			()	(-	,			(33) +	(36) =			105.45	(37)
Ventila	ition hea	at loss ca	alculated	d monthly	y				(38)m	= 0.33 × (25)m x (5)	'		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	58.08	57.74	57.42	55.89	55.61	54.27	54.27	54.03	54.79	55.61	56.18	56.79		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	163.53	163.19	162.87	161.34	161.06	159.72	159.72	159.48	160.24	161.06	161.63	162.24		
									,	Average =	Sum(39) ₁ .	12 /12=	161.34	(39)
Heat Id	ss para	meter (F	HLP), W/	/m²K		·			(40)m	= (39)m ÷	(4)			
(40)m=	1.53	1.52	1.52	1.51	1.5	1.49	1.49	1.49	1.5	1.5	1.51	1.51		–
Numbe	er of day	rs in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.51	(40)
Numbe	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
· /	_		· ·		-									. ,
						l					ı			
1 \\/s	ater heat	ing ener	rav reaui	irement:								k\/\h/ve	or.	
4. Wa	iter heat	ing enei	rgy requi	irement:								kWh/ye	ear:	
Assum	ied occu	ıpancy, İ	N		/ 0.0000	1 140 · · /TF				FFA 40		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ipancy, I 9, N = 1	N		(-0.0003	349 x (TF				ΓFA -13.			ear:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ipancy, I 9, N = 1 9, N = 1	N + 1.76 x	:[1 - exp	(-0.0003	•	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.	.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da 5% if the d	ay Vd,av	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (⁻ + 36		100	.8	ear:	, ,
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, f	ay Vd,avelwelling is thot and co	FA -13.9 erage = designed to)2)] + 0.0 (25 x N) to achieve	0013 x ([*] + 36 a water us	se target o	9) 100).62	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, h	ay Vd,ave lwelling is thot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36		100	.8	ear:	, ,
Assum if TF if TF Annua Reduce not more	led occu A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb	N + 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fac	ay Vd,avelling is that and condition Jun	FA -13.9 erage = designed to ld) Jul Fable 1c x	(25 x N) to achieve Aug (43)	0013 x (⁻ + 36 a water us Sep	se target o	9) 100 f	.8 0.62 Dec	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, h	ay Vd,ave lwelling is thot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us Sep	Oct	9) 100 Nov	.8 0.62 Dec		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fac	ay Vd,avelling is that and conductor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (⁻ + 36 a water us Sep	Oct 102.63 Total = Su	Nov 106.65 m(44) ₁₁₂ =	Dec 110.68	ear: 1207.41	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fac 94.58	ay Vd,avelling is that and conductor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (⁻ + 36 a water us Sep	Oct 102.63 Total = Su	Nov 106.65 m(44) ₁₁₂ =	Dec 110.68		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 106.65	H + 1.76 x ater usage hot water person per Mar aday for ear 102.63	ge in litre usage by r day (all w Apr ach month 98.61	es per da 5% if the day atter use, P May $Vd, m = fac$ 94.58	ay Vd,avelwelling is that and contains from Tour go.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us 98.61 - 9 kWh/mor 115.06	Oct 102.63 Total = Su 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1	.8 Dec 110.68 c, 1d)		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per p Feb n litres per 106.65 hot water	H + 1.76 x ater usage hot water person per Mar 102.63 used - calconders 148.13	ge in litre usage by a day (all wash month 98.61	es per da 5% if the day atter use, P May $Vd, m = fac$ 94.58	ay Vd,avdwelling is that and co. Jun ctor from 7 90.56 190 x Vd,rd 106.93	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71	98.61 98.61 115.06	Oct 102.63 Total = Su 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	.8 Dec 110.68 c, 1d)	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ined occur if A > 13.9 if A £	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar 102.63 used - calconders 148.13	ge in litre usage by a day (all wash month 98.61	es per da 5% if the de tater use, l' May Vd,m = fact 94.58 conthly = 4.	ay Vd,avdwelling is that and co. Jun ctor from 7 90.56 190 x Vd,rd 106.93	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71	98.61 98.61 115.06	Oct 102.63 Total = Su 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	.8 Dec 110.68 c, 1d)	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water 143.55 vater heatin 21.53 IOSS:	H + 1.76 x ater usage hot water person per Mar day for ear 102.63 used - calculated 148.13 and at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (not 19.37)	es per da 5% if the da 5% if th	ay Vd,ave livelling is that and co. Jun ctor from 1 90.56 190 x Vd,r. 106.93	erage = designed to did) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46) 17.06	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	Dec 110.68 c, 1d) 158.96 c 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum	ipancy, I ipancy, I	N + 1.76 x ater usage hot water person per Mar day for each 102.63 used - calconding at point 22.22	ge in litre usage by a day (all we hand) Apr	es per da 5% if the de 5% if the 5% if the de 5% if the de 5% if the de 5% if the de 5% if the d	ay Vd,avdwelling is that and co. Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	.8 Dec 110.68 c, 1d)	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If comi	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volumemunity h	ppancy, I P, N = 1 e hot wa al average litres per p Feb 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres)	H + 1.76 x ater usage hot water person per Mar 102.63 used - calc 148.13 ang at point 22.22 including and no talc 148.13	ge in litre usage by r day (all w Apr ach month 98.61 129.15 of use (not) 19.37 and any so	es per da 5% if the d rater use, f May Vd,m = fac 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W relling, e	ay Vd,ave levelling is that and co. Jun ctor from 7 90.56 190 x Vd,r. 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	Nov 106.65 m(44)12 = ables 1b, 1 146.38 m(45)12 = 21.96	Dec 110.68 c, 1d) 158.96 c 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volumemunity h	ppancy, I p, N = 1 p, N = 1 e hot wa al average litres per p 106.65 hot water 143.55 rater heatin 21.53 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar 102.63 used - calc 148.13 ang at point 22.22 including and no talc 148.13	ge in litre usage by r day (all w Apr ach month 98.61 129.15 of use (not) 19.37 and any so	es per da 5% if the de 5% if the 5% if the de 5% if the de 5% if the de 5% if the de 5% if the d	ay Vd,ave levelling is that and co. Jun ctor from 7 90.56 190 x Vd,r. 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	Nov 106.65 m(44)12 = ables 1b, 1 146.38 m(45)12 = 21.96	Dec 110.68 c, 1d) 158.96 c 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - calconding at point 22.22 including and no talconding to talconding the calconding the calconding at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (not appeared to the art of t	es per da 5% if the d rater use, f May Vd,m = fac 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W relling, e	ay Vd,avd lwelling is that and co. Jun ctor from Ti 90.56 190 x Vd,ri 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed of ld) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	9) Nov 106.65 m(44) 112 = ables 1b, 1 146.38 m(45) 112 = 21.96	Dec 110.68 c, 1d) 158.96 c 23.84	1207.41	(43) (44) (45) (46)

Energy lost from water storage, kWh/year		(48) x (49)	=			0		(50)
· · · · · · · · · · · · · · · · · · ·	inanufacturer's declared cylinder loss factor is not known: after storage loss factor from Table 2 (kWh/litre/day) in a factor from Table 2a e factor from Table 2b y lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (53) y lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) (50) or (54) in (55) storage loss calculated for each month ((56)m = (55) x (41)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							
-	ilie/uay)					0		(51)
Volume factor from Table 2a						0]	(52)
Temperature factor from Table 2b								(53)
Energy lost from water storage, kWh/year		(47) x (51)	x (52) x (5	53) =		0]	(54)
Enter (50) or (54) in (55)						0		(55)
Water storage loss calculated for each month		((56)m = (55) × (41)r	n				
(56)m= 0 0 0 0 0	0 0	0	0	0	0	0		(56)
If cylinder contains dedicated solar storage, (57) m = (56) m x $[(60)$ m x (50) m	(50) – (H11)] ÷ (5	0), else (5	7)m = (56)ı	m where (H11) is fro	m Append	lix H	
(57)m= 0 0 0 0 0	0 0	0	0	0	0	0		(57)
Primary circuit loss (annual) from Table 3	•					0		(58)
,	$0)$ m = (58) \div 36	65 × (41)	m					
(modified by factor from Table H5 if there is sola	ar water heatii	ng and a	cylinder	thermo	stat)		_	
(59)m= 0 0 0 0 0	0 0	0	0	0	0	0		(59)
Combi loss calculated for each month (61)m = (60	0) ÷ 365 × (41))m						
(61)m= 50.96 46.03 50.96 48.63 48.2 4	44.66 46.15	48.2	48.63	50.96	49.32	50.96		(61)
Total heat required for water heating calculated fo	or each month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
		r `	- i		, ,	r í		(62)
Solar DHW input calculated using Appendix G or Appendix H	(negative quantity	y) (enter '0	if no solar	contributi	on to wate	r heating)	ı	
(add additional lines if FGHRS and/or WWHRS ap	pplies, see Ap	pendix C	6)					
(63)m= 0 0 0 0 0	0 0	0	0	0	0	0		(63)
Output from water heater							•	
· · · · · · · · · · · · · · · · · · ·	51.59 145.24	161.9	163.69	185.05	195.69	209.91	· 	
· · · · · · · · · · · · · · · · · · ·	51.59 145.24					<u> </u>	2166.73	(64)
(64)m= 215.09 189.58 199.09 177.77 172.12 1	I	Outp	ut from wa	ater heater	(annual)₁	12		(64)
(64)m= 215.09 189.58 199.09 177.77 172.12 199.09 Heat gains from water heating, kWh/month 0.25	[0.85 × (45)m	Outp 1 + (61)m	ut from wa	ater heater	(annual) ₁ + (57)m	+ (59)m		
(64)m= 215.09 189.58 199.09 177.77 172.12 19 Heat gains from water heating, kWh/month 0.25 (65)m= 67.31 59.24 61.99 55.1 53.25 4	[0.85 × (45)m 46.72 44.48	Outp 1 + (61)m 49.86	ut from wa] + 0.8 x 50.42	ater heater (46)m 57.33	(annual)₁ + (57)m 61	+ (59)m]	
(64)m= 215.09 189.58 199.09 177.77 172.12 19 Heat gains from water heating, kWh/month 0.25 (65)m= 67.31 59.24 61.99 55.1 53.25 4	[0.85 × (45)m 46.72 44.48	Outp 1 + (61)m 49.86	ut from wa] + 0.8 x 50.42	ater heater (46)m 57.33	(annual)₁ + (57)m 61	+ (59)m]	
(64)m= 215.09 189.58 199.09 177.77 172.12 19 Heat gains from water heating, kWh/month 0.25 7 (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a):	[0.85 × (45)m 46.72 44.48	Outp 1 + (61)m 49.86	ut from wa] + 0.8 x 50.42	ater heater (46)m 57.33	(annual)₁ + (57)m 61	+ (59)m]	
(64)m= 215.09 189.58 199.09 177.77 172.12 19 Heat gains from water heating, kWh/month 0.25 7 (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	[0.85 × (45)m 46.72 44.48 nder is in the o	Outp 1 + (61)m 49.86 dwelling	ut from wa] + 0.8 x 50.42 or hot wa	iter heater [(46)m 57.33 ater is fr	(annual) ₁ + (57)m 61 om com	+ (59)m 65.59 munity h]	
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May	[0.85 × (45)m 46.72 44.48 nder is in the o	Outp 1 + (61)m 49.86 dwelling	ut from wa] + 0.8 x 50.42 or hot wa	i [(46)m 57.33 ater is fr	(annual) ₁ + (57)m 61 om com	+ (59)m 65.59 munity h]	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 (65)m= (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83 <	[0.85 × (45)m 46.72	Outp 1 + (61)m 49.86 dwelling Aug 139.83	sut from was 1] + 0.8 x 50.42 or hot was Sep 139.83	i [(46)m 57.33 ater is fr	(annual) ₁ + (57)m 61 om com	+ (59)m 65.59 munity h]	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83 13	[0.85 × (45)m 46.72	Outp 1 + (61)m 49.86 dwelling Aug 139.83 Iso see	Sep 139.83	oter heater 57.33 ater is fr Oct 139.83	(annual) ₁ + (57)m 61 om com Nov 139.83	+ (59)m 65.59 munity h]	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83 13	Jun Jul 39.83 139.83 n L9 or L9a), a 8.23 8.89	Outp 1 + (61)m 49.86 dwelling Aug 139.83 Iso see	Sep 139.83 Table 5	oter heater 57.33 ater is fr Oct 139.83	(annual) ₁ + (57)m 61 om com Nov 139.83	+ (59)m 65.59 munity h]	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83 139.83 139.83 139.83 139.83 139.83 139.83 139.83 139.83 139.83 139.83 149.83 Lighting gains (calculated in Appendix L, equation (67)m= 23.84 21.17 17.22 13.04 9.74 8 Appliances gains (calculated in Appendix L, equation (calculated in Appendix L)	Jun Jul 39.83 139.83 n L9 or L9a), a 8.23 8.89	Outp 1 + (61)m 49.86 dwelling Aug 139.83 Iso see	Sep 139.83 Table 5	oter heater 57.33 ater is fr Oct 139.83	(annual) ₁ + (57)m 61 om com Nov 139.83	+ (59)m 65.59 munity h]	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 from the color of th	Jun Jul 139.83 139.83 1 L9 or L9a), a 18.23 8.89 111.83 200.03	Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26	Sep 139.83 Table 5 15.51 see Table 204.25	Oct 139.83 19.69 Dle 5 219.13	(annual) ₁ + (57)m 61 om com Nov 139.83	+ (59)m 65.59 munity h Dec 139.83]	(65) (66) (67)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 / (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling cyling in cyling gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83	Jun Jul 139.83 139.83 1 L9 or L9a), a 18.23 8.89 111.83 200.03	Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26	Sep 139.83 Table 5 15.51 see Table 204.25	Oct 139.83 19.69 Dle 5 219.13	(annual) ₁ + (57)m 61 om com Nov 139.83	+ (59)m 65.59 munity h Dec 139.83]	(65) (66) (67)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cylings 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83	Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jun Jun Jun Jul Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	Outp 1 + (61)m 49.86 dwelling 139.83 Iso see 11.55 3a), also 197.26), also se	Sep 139.83 Fable 5 15.51 see Table to 1.8 x 50.42 Sep 139.83	Oct 139.83 19.69 DIE 5 219.13	(annual) ₁ + (57)m 61 om com Nov 139.83 22.98	+ (59)m 65.59 munity h Dec 139.83 24.5]	(65) (66) (67) (68)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling cyling 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83	Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jun Jun Jun Jul Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	Outp 1 + (61)m 49.86 dwelling 139.83 Iso see 11.55 3a), also 197.26), also se	Sep 139.83 Fable 5 15.51 see Table to 1.8 x 50.42 Sep 139.83	Oct 139.83 19.69 DIE 5 219.13	(annual) ₁ + (57)m 61 om com Nov 139.83 22.98	+ (59)m 65.59 munity h Dec 139.83 24.5]	(65) (66) (67) (68)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling cyling included (57)m in calculation of (65)m only if cyling included (65)m 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83	Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun	Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also see 36.98	Sep 139.83 Fable 5 15.51 see Table 204.25 see Table 36.98	Oct 139.83 19.69 Dle 5 219.13 5 36.98	(annual) ₁ + (57)m 61 om com Nov 139.83 22.98 237.92	+ (59)m 65.59 munity h Dec 139.83 24.5 255.58]	(65) (66) (67) (68) (69)
(64)m= 215.09 189.58 199.09 177.77 172.12 13 Heat gains from water heating, kWh/month 0.25 ′ (65)m= 67.31 59.24 61.99 55.1 53.25 4 include (57)m in calculation of (65)m only if cyling calculated (57)m in calculation of (65)m only if cyling calculated (66)m= 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May (66)m= 139.83 <t< td=""><td>Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun</td><td>Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also see 36.98</td><td>Sep 139.83 Fable 5 15.51 see Table 204.25 see Table 36.98</td><td>Oct 139.83 19.69 Dle 5 219.13 5 36.98</td><td>(annual)₁ + (57)m 61 om com Nov 139.83 22.98 237.92</td><td>+ (59)m 65.59 munity h Dec 139.83 24.5 255.58</td><td>]</td><td>(65) (66) (67) (68) (69)</td></t<>	Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun Jun Jun Jul Jun Jun Jun Jun Jul Jun	Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also see 36.98	Sep 139.83 Fable 5 15.51 see Table 204.25 see Table 36.98	Oct 139.83 19.69 Dle 5 219.13 5 36.98	(annual) ₁ + (57)m 61 om com Nov 139.83 22.98 237.92	+ (59)m 65.59 munity h Dec 139.83 24.5 255.58]	(65) (66) (67) (68) (69)

Water	heating	g gains (T	able 5)												
(72)m=	90.48	88.15	83.33	76.52	71.58	6	4.89	59.79	67.	01 70.02	77.05	84.72	88.16		(72)
Total i	nterna	l gains =				-	(66))m + (67)m	+ (68	B)m + (69)m + ((70)m +	(71)m + (72)	m	l	
(73)m=	449.64	447.43	431.66	405.79	378.76	3	52.89	336.66	343	.77 357.73	383.8	3 413.57	436.19		(73)
6. Sol	ar gair	ns:													
Solar g	ains are	calculated (using solar	flux from	Table 6a	and	assoc	iated equa	tions	to convert to th	e applic	able orientat	ion.		
Orienta		Access F	actor	Area			Flu			g _		FF		Gains	
		Table 6d		m²			Ta	ble 6a		Table 6b		Table 6c		(W)	
Northea	ast _{0.9x}	0.54	X	10.	39	X	1	1.28	X	0.63	X	0.7	=	25.13	(75)
Northea	ast _{0.9x}	0.77	X	2.	1	X	1	1.28	X	0.63	X	0.7	=	7.24	(75)
Northea	ast _{0.9x}	0.77	X	3.	2	X	1	1.28	x	0.63	X	0.7	=	11.03	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X	2	22.97	X	0.63	X	0.7	=	51.14	(75)
Northea	ast _{0.9x}	0.77	X	2.	1	X	2	22.97	X	0.63	X	0.7	=	14.74	(75)
Northea	ast _{0.9x}	0.77	X	3	2	X	2	22.97	x	0.63	x	0.7	=	22.46	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X	4	11.38	x	0.63	x	0.7	=	92.14	(75)
Northea	ast _{0.9x}	0.77	X	2.	1	X		11.38	x	0.63	x	0.7	=	26.56	(75)
Northea	ast _{0.9x}	0.77	X	3.	2	X		11.38	x	0.63	×	0.7	=	40.47	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X	6	67.96	x	0.63	×	0.7	=	151.33	(75)
Northea	ast _{0.9x}	0.77	x	2.	1	X	6	67.96	x	0.63	×	0.7	=	43.61	(75)
Northea	ast 0.9x	0.77	x	3.	2	X	6	67.96	x	0.63	×	0.7		66.46	(75)
Northea	ast 0.9x	0.54	X	10.	39	X	9	91.35	x	0.63	x	0.7	=	203.41	(75)
Northea	ast 0.9x	0.77	X	2.	1	X	9	91.35	x	0.63	x	0.7	=	58.62	(75)
Northea	ast _{0.9x}	0.77	X	3.	2	X	9	91.35	х	0.63	×	0.7	=	89.33	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X	9	97.38	x	0.63	x	0.7	=	216.86	(75)
Northea	ast 0.9x	0.77	X	2.	1	X	9	97.38	x	0.63	x	0.7	=	62.5	(75)
Northea	ast _{0.9x}	0.77	X	3.	2	X	9	97.38	x	0.63	×	0.7		95.24	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X		91.1	x	0.63	×	0.7		202.87	(75)
Northea	ast _{0.9x}	0.77	x	2.	1	X		91.1	x	0.63	×	0.7		58.47	(75)
Northea	ast _{0.9x}	0.77	X	3.	2	X		91.1	x	0.63	×	0.7		89.09	(75)
Northea	ast _{0.9x}	0.54	X	10.	39	X	7	72.63	x	0.63	×	0.7		161.73	(75)
Northea	ast 0.9x	0.77	x	2.	1	X	7	72.63	x	0.63	×	0.7		46.61	(75)
Northea	ast _{0.9x}	0.77	x	3.	2	X	7	72.63	х	0.63	×	0.7	_ =	71.03	(75)
Northea	ast _{0.9x}	0.54	x	10.	39	X	5	50.42	х	0.63	×	0.7	-	112.28	(75)
Northea	ast 0.9x	0.77	x	2.	1	X		50.42	х	0.63	×	0.7	╡ -	32.36	(75)
Northea	ast 0.9x	0.77	x	3.	2	X	- 5	50.42	х	0.63	×	0.7	=	49.31	(75)
Northea	ast _{0.9x}		x	10.		X		28.07	x	0.63	×	0.7	=	62.5	(75)
Northea	ast _{0.9x}		x	2.		X		28.07	x	0.63	×	0.7	╡ =	18.01	(75)
Northea	ast _{0.9x}		x	3.:	===	X		28.07	X	0.63	×	0.7	= =	27.45	(75)
Northea	ast _{0.9x}		x	10.		X		14.2	X	0.63	×	0.7	= =	31.61	(75)
Northea	ast _{0.9x}		x	2.		x		14.2	x	0.63	×	0.7	=	9.11	(75)

Northeast _{0.9x}	0.77	X	3.2		x \square	14.2	X	0.63	x	0.7		13.88	(75)
Northeast _{0.9x}	0.54	X	10.3	39	x $\overline{}$	9.21	X	0.63	x	0.7	=	20.52	(75)
Northeast _{0.9x}	0.77	X	2.1		x	9.21	X	0.63	×	0.7		5.91	(75)
Northeast _{0.9x}	0.77	X	3.2	<u> </u>	x	9.21	X	0.63	×	0.7	-	9.01	(75)
Southeast _{0.9x}	0.77	X	2.7	-	x	36.79	X	0.63	x	0.7	- -	30.36	(77)
Southeast _{0.9x}	0.77	X	2.7		x	62.67	X	0.63	x	0.7		51.72	(77)
Southeast 0.9x	0.77	х	2.7	,	x	85.75	X	0.63	x	0.7	=	70.76	(77)
Southeast _{0.9x}	0.77	x	2.7		x	106.25	x	0.63	x	0.7	=	87.67	(77)
Southeast _{0.9x}	0.77	х	2.7	,	x	119.01	X	0.63	x	0.7	=	98.2	(77)
Southeast 0.9x	0.77	х	2.7		х	118.15	x	0.63	x	0.7	=	97.49	(77)
Southeast _{0.9x}	0.77	X	2.7	,	x	113.91	x	0.63	x	0.7	=	93.99	(77)
Southeast _{0.9x}	0.77	х	2.7	,	х	104.39	x	0.63	x	0.7	<u> </u>	86.14	(77)
Southeast _{0.9x}	0.77	X	2.7		x	92.85	x	0.63	x	0.7	=	76.62	(77)
Southeast _{0.9x}	0.77	X	2.7	,	x	69.27	x	0.63	x	0.7	=	57.16	(77)
Southeast _{0.9x}	0.77	X	2.7	,	x	44.07	X	0.63	x	0.7	=	36.37	(77)
Southeast _{0.9x}	0.77	X	2.7	,	x	31.49	X	0.63	x	0.7	=	25.98	(77)
Southwest _{0.9x}	0.77	X	5.8	5	x	36.79	Ī	0.63	x	0.7	=	65.22	(79)
Southwest _{0.9x}	0.77	X	5.8	3	x	62.67	Ī	0.63	x	0.7	=	111.09	(79)
Southwest _{0.9x}	0.77	X	5.8	3	x	85.75	Ī	0.63	x	0.7	=	152	(79)
Southwest _{0.9x}	0.77	X	5.8	;	x	106.25	Ī	0.63	x	0.7	=	188.34	(79)
Southwest _{0.9x}	0.77	X	5.8	3	x	119.01	Ī	0.63	x	0.7	=	210.95	(79)
Southwest _{0.9x}	0.77	X	5.8	3	x	118.15	Ī	0.63	x	0.7	=	209.43	(79)
Southwest _{0.9x}	0.77	X	5.8	;	x	113.91	Ī	0.63	x	0.7	=	201.91	(79)
Southwest _{0.9x}	0.77	X	5.8		x	104.39	Ī	0.63	x	0.7	=	185.04	(79)
Southwest _{0.9x}	0.77	X	5.8		x	92.85	Ī	0.63	x	0.7	=	164.59	(79)
Southwest _{0.9x}	0.77	х	5.8	3	x	69.27	Ī	0.63	x	0.7	=	122.78	(79)
Southwest _{0.9x}	0.77	X	5.8	3	x	44.07	Ī	0.63	x	0.7	<u> </u>	78.12	(79)
Southwest _{0.9x}	0.77	x	5.8		x	31.49	Ī	0.63	x	0.7	=	55.81	(79)
_													
Solar gains in							 	n = Sum(74)m			•	7	
(83)m= 138.98	251.15	381.93	537.41	660.53	681.5		550	.54 435.15	287.9	169.09	117.24]	(83)
Total gains – i			<u>`</u>		<u> </u>		T		1	. 1	T	1	(0.1)
(84)m= 588.62	698.58	813.58	943.2	1039.28	1034.	41 982.99	894	.31 792.88	671.7	3 582.67	553.43		(84)
7. Mean inter	nal temp	erature	(heating	seasor	1)								
Temperature	•	•			•		ble 9	, Th1 (°C)				21	(85)
Utilisation fac		1						-	1		Γ	1	
Jan	Feb	Mar	Apr	May	Ju		+	ug Sep	+	Nov	Dec	1	
(86)m= 1	1	0.99	0.97	0.92	0.8	0.65	0.7	72 0.91	0.99	1	1]	(86)
Mean interna	l tempera	ature in I	iving are	a T1 (f	ollow	steps 3 to	7 in T	able 9c)				_	
(87)m= 19.24	19.41	19.72	20.15	20.55	20.8	4 20.95	20.	92 20.68	20.17	19.63	19.21]	(87)
Temperature	during h	eating p	eriods in	rest of	dwelli	ng from Ta	able 9	9, Th2 (°C)				_	
(88)m= 19.67	19.67	19.67	19.68	19.69	19.6	9 19.69	19	.7 19.69	19.69	19.68	19.68]	(88)
<u> </u>		•	•									_	

Utilisa	ation fac	tor for g	ains for ı	rest of d	welling,	h2,m (se	ee Table	9a)						
(89)m=	1	1	0.99	0.96	0.88	0.7	0.49	0.56	0.85	0.98	1	1		(89)
Mean	internal	temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	le 9c)				
(90)m=	17.35	17.61	18.06	18.68	19.23	19.58	19.68	19.66	19.42	18.71	17.93	17.32		(90)
				=		-			f	fLA = Livin	g area ÷ (4	4) =	0.15	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwe	llina) = f	LA × T1	+ (1 – fL	.A) × T2			•		
(92)m=	17.63	17.87	18.3	18.89	19.43	19.77	19.86	19.85	19.61	18.93	18.18	17.6		(92)
Apply	adjustm	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	17.63	17.87	18.3	18.89	19.43	19.77	19.86	19.85	19.61	18.93	18.18	17.6		(93)
8. Sp	ace heat	ting requ	uirement											
						ed at st	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	tilisation													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac				0.07		0.54	0.50	2.24		0.00			(0.4)
(94)m=	1	0.99	0.98	0.95	0.87	0.7	0.51	0.58	0.84	0.97	0.99	1		(94)
	ul gains, 586.43	693.25	798.91	4)m x (84 896.04	·	700.0	502.34	518.76	669.39	651.13	E70 E7	<i>EE</i> 4 02		(95)
(95)m=					902.31	728.9	502.34	316.76	009.39	051.13	578.57	551.83		(90)
(96)m=	hly avera	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
							=[(39)m :				7.1	7.2		(00)
(97)m=	2179.97			1612.35	1244.67	825.4	521.18	550.1	882.5	1340.79	1790.71	2173.49		(97)
						l	th = 0.02							` ,
(98)m=	1185.59	956.87	835.79	515.74	254.71	0	0	0	0	513.11	872.74	1206.52		
						!		Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	6341.07	(98)
Space	e heating	a reauire	ement in	kWh/m²	² /vear							ļ	59.18	(99)
•		•			•	votomo i	paludipa	mioro C	יחט/				33.13	
	ergy req e heatin		its – mai	ividuai n	eating s	ystems i	ncluding	micro-C	,ПР)					
•	ion of sp	_	it from se	econdar	v/supple	mentary	svstem					ſ	0	(201
	ion of sp					,	•	(202) = 1 -	- (201) =				1	(202
	ion of tot			-	` ,			(204) = (2	02) × [1 –	(203)] =			1	(204
	ency of r		_	-				(, (-	,[.	(/1				(206
	•	•		• •			- 0/					l	93.4	╡`
ETTICIE	ency of s	econda	ry/supple	ementar	y neatin	g systen	1, % 						0	(208
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space	e heating		<u> </u>								1			
	1185.59	956.87	835.79	515.74	254.71	0	0	0	0	513.11	872.74	1206.52		
(211)m	$1 = \{[(98)]$			00 ÷ (20)6)									(211
	1269.37	1024.49	894.85	552.18	272.71	0	0	0	0	549.37	934.41	1291.77		_
								Tota	I (kWh/yea	ar) =Sum(2	211),5,1012	F	6789.16	(211
•	e heating	•		• •	month									
= {[(98)m x (20					i	1			ı				
	0	0	0	0	0	0	0	0	0	0	0			
(215)m=	L U	U	0	U	U		0			ar) =Sum(2		0	0	(215

Water heating								
Output from water heater (calculated above) 215.09	51.59 145.24	161.9	163.69	185.05	195.69	209.91		
Efficiency of water heater							80.3	(216)
(217)m= 88.69 88.56 88.26 87.58 86.04	80.3 80.3	80.3	80.3	87.48	88.36	88.75		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m	•						•	
(219)m= 242.53 214.07 225.56 202.99 200.05 1	88.78 180.87	201.62	203.85	211.53	221.46	236.53		_
		Total	= Sum(2				2529.85	(219)
Annual totals Space heating fuel used, main system 1				k'	Wh/year	•	kWh/year	7
							6789.16	_
Water heating fuel used							2529.85	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			75	(231)
Electricity for lighting							420.97	(232)
12a. CO2 emissions – Individual heating system	s including mi	icro-CHP						
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x			0.2	16	=	1466.46	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	546.45	(264)
Space and water heating	(261) + (262)	+ (263) + (2	264) =				2012.91	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	218.48	(268)
Total CO2, kg/year			sum o	f (265)(2	271) =		2270.32	(272)

TER =

(273)

21.19

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 20)12		Strom Softwa					016363 on: 1.0.4.10	
		Pro	operty .	Address	: Flat 0-2	2-Lean				
Address :										
1. Overall dwelling dimen	Sions:		Aro	a(m²)		Av. Hei	abt/m\		Volume(m³	`
Basement				<u> </u>	(1a) x		.1	(2a) =	134.45) (3a)
Ground floor					(1b) x		.6](2b) =	173.97	(3b)
	. (41-) . (4 -) . (4 -1) . (4	1-1. (4-)					.0	(20) –	173.97	(30)
Total floor area TFA = (1a)	+(1b)+(1c)+(1d)+(1	ie)+(1n)	1	10.28	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d))+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:				-4b		4-4-1				_
	main heating	secondary heating		other	_	total			m³ per hou	r
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fans	<u> </u>		_			4	x ′	10 =	40	(7a)
Number of passive vents					Ē	0	x	10 =	0	(7b)
Number of flueless gas fire	es				F	0	x 4	40 =	0	(7c)
_					L					
								Air ch	anges per ho	ur
Infiltration due to chimneys	s, flues and fans =	(6a)+(6b)+(7a	a)+(7b)+(7c) =		40		÷ (5) =	0.13	(8)
If a pressurisation test has been		ded, proceed	to (17), o	otherwise (continue fr	om (9) to (16)			_
Number of storeys in the Additional infiltration	e dwelling (ns)						[(0)	4100.4	0	(9)
Structural infiltration: 0.2	5 for steel or timbe	r frame or (0 35 foi	r masoni	rv constr	ruction	[(9)-	-1]x0.1 =	0	(10)
if both types of wall are pre-					•	dollon			0	(11)
deducting areas of opening			. , .							_
If suspended wooden flo	,	•	l (seale	ed), else	enter 0				0	(12)
If no draught lobby, ente	·								0	(13)
Percentage of windows Window infiltration	and doors draught	stripped		0.25 - [0.2) v (1.4\ · 1	1001 -			0	(14)
Infiltration rate						100] = 12) + (13) +	. (15) –		0	(15)
Air permeability value, q	50 everessed in a	ihic metres		. , . ,		, , ,		aroa	0	(16)
If based on air permeability	•		•		•	elle oi e	ilvelope	aica	0.38	(17)
Air permeability value applies						is being us	sed		0.36	(10)
Number of sides sheltered				, ,	,	J			3	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorporating	g shelter factor			(21) = (18) x (20) =				0.29	(21)
Infiltration rate modified for	monthly wind spec	ed								_
Jan Feb N	Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	ed from Table 7									

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

(22)m=

Wind Factor (2	2a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A .I' - a (- 1 ' - C')(- /-11- '	(-11	.1		(04 -)	(00-)	•	ı			
Adjusted infiltra	0.37	e (allowi 0.36	ng for sr 0.32	0.32	a wina s	0.28	(21a) X 0.27	(22a)m 0.29	0.32	0.33	0.35		
Calculate effec							0.27	0.29	0.32	0.33	0.55		
If mechanica	ıl ventila	tion:										C	(23a)
If exhaust air he	eat pump (using Appe	endix N, (2	3b) = (23a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	o) = (23a)			C	(23b)
If balanced with	heat reco	very: effic	iency in %	allowing for	or in-use f	actor (fron	n Table 4h) =				C	(23c)
a) If balance		anical ve		with hea		- ` ` 	- ^ `	ŕ	2b)m + (1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance							- ^ ` ` 	``	 	- 			()
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole he				•	•				F (00h	.\			
if (22b)m (24c)m= 0	0.5 x	(23b), t	nen (240	c) = (230 0	o); otnerv	wise (24	C) = (220)) m + 0	.5 × (230	0	0		(24c)
(' '									0	0	0		(240)
d) If natural v if (22b)m									0.5]				
(24d)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(24d)
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	· (25)					
(25)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)
3. Heat losses	s and he	at loss r	paramete	er:									
3. Heat losses	s and he Gros	·	oaramete Openin		Net Ar	ea	U-valı	ue	AXU		k-value)	AXk
ELEMENT		S		gs	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Doors	Gros area	S	Openin	gs		m² x	W/m2	= =		<) 			
ELEMENT	Gros area	S	Openin	gs	A ,r	m² x	W/m2	= =	(W/I	<) 			kJ/K
ELEMENT Doors	Gros area	S	Openin	gs	A ,r	m ² x s x1	W/m2	eK = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Doors Windows Type	Gros area 1	S	Openin	gs	A ,r 2.6	m ² x x x 1 x 1	W/m2 1.2 /[1/(1.4)+	0.04] = 0.04] =	(W/F 3.12 14.23	<) 			kJ/K (26) (27)
ELEMENT Doors Windows Type Windows Type	Gros area 1 2 3	S	Openin	gs	A ,r 2.6 10.73 2.17	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	(W/H 3.12 14.23 2.88	<) 			kJ/K (26) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type	Gros area 1 2 3 4	S	Openin	gs	A ,r 2.6 10.73 2.17 3.3	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/F 3.12 14.23 2.88 4.37	<)			kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 3 4	S	Openin	gs	A ,r 2.6 10.73 2.17 3.3 5.98	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/k 3.12 14.23 2.88 4.37 7.93	<)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 3 4	S	Openin	gs	A ,r 2.6 10.73 2.17 3.3 5.98 2.79	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/N 3.12 14.23 2.88 4.37 7.93 3.7				kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1	Gros area 1 2 3 4	ss (m²)	Openin	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13	0.04] = 0.04]	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2	Gros area 1 2 3 4 5	ss (m²)	Openin m	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13	0.04] = 0.04]	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343				kJ/K (26) (27) (27) (27) (27) (27) (28)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1	Gros area 1 2 3 4 5	ss (m²)	Openin	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = 0.	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1				kJ/K (26) (27) (27) (27) (27) (27) (28) (28)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2	Gros area 1 2 3 4 5	ss (m²)	27.55 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18	0.04] = 0.04]	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3	Gros area 1 2 3 4 5 44.8 3.2 43.0	1 7 3	27.55 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2 43.07	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18 0.18	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58 7.75				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4	Gros area 1 2 3 4 5 44.8 3.2 43.0 28.3	1 7 3 5	27.5; 0 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2 43.07 28.33	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18 0.18 0.18	K	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58 7.75 5.1				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5	Gros area 1 2 3 4 5 44.8 3.2 43.0 28.3 56.9	1 7 3 5 7	27.5; 0 0 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2 43.07 28.33 56.95	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18 0.18 0.18 0.18 0.18	K	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58 7.75 5.1				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Roof Type1	Gros area 1 2 3 4 5 44.8 3.2 43.0 28.3 56.9 10.5	1 7 3 5 7	27.57 0 0 0 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2 43.07 28.33 56.95 10.57	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18 0.18 0.18 0.18 0.18 0.18	K	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58 7.75 5.1 10.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type5 Roof Type1 Roof Type2	Gros area 1 2 3 4 5 44.8 3.2 43.0 28.3 56.9 10.5	1 7 3 5 7	27.57 0 0 0 0	gs ²	A ,r 2.6 10.73 2.17 3.3 5.98 2.79 43.37 34.11 17.24 3.2 43.07 28.33 56.95	m ²	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.13 0.18 0.18 0.18 0.18 0.18 0.18	K	(W/N 3.12 14.23 2.88 4.37 7.93 3.7 5.6381 4.4343 3.1 0.58 7.75 5.1 10.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)

Party of	eilina					62.16					Г			(32b)
-	•	roof winde	ows, use e	effective wi	indow U-va			formula 1	/[(1/U-valu	ıe)+0.04] a	L ns given in	paragraph	3.2	(02.5)
					ls and part					,	ŭ	, , ,		
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				75.07	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	40709.07	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value	Medium		250	(35)
	•				constructi	ion are no	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
			tailed calc		using Ap	nendiy l	~					i	22.00	(36)
	•	,	,		= 0.15 x (3	•	`					l	32.08	(30)
	abric he			()	(-	,			(33) +	(36) =			107.15	(37)
Ventila	ition hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)	'		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	58.05	57.77	57.5	56.22	55.98	54.86	54.86	54.66	55.29	55.98	56.47	56.97		(38)
Heat tr	ansfer c	oefficier	nt, W/K	-	-	-	_		(39)m	= (37) + (37)	38)m			
(39)m=	165.2	164.92	164.65	163.37	163.13	162.01	162.01	161.81	162.44	163.13	163.61	164.12		
						•	•	•			Sum(39) ₁ .	12 /12=	163.37	(39)
	_	<u> </u>	HLP), W		1	·		ı		= (39)m ÷				
(40)m=	1.5	1.5	1.49	1.48	1.48	1.47	1.47	1.47	1.47	1.48	1.48	1.49	4.40	— (40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.48	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
				l										
4. Wa	iter heat	ing ener	rgy requi	irement:								kWh/ye	ear:	
			rgy requi	irement:								kWh/ye	ear:	
Assum	ied occu	ıpancy, İ	N		·(-0 0003	349 x (TF	FA -13 9)2)] + 0 (0013 x (ΓFA -13		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ıpancy, İ	N		o(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.			ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	[1 - exp	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	[1 - exp ge in litre usage by		ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ned occu A > 13.9 A £ 13.9 I averag the annua o that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av Iwelling is thot and co	erage = designed i ld)	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the o	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	led occu A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb	N + 1.76 x ater usag hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	ay Vd,av Iwelling is that and co Jun ctor from T	erage = designed in different land land land land land land land land	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 99.07	Oct	9) 10°	1.09 Dec 111.2	ear: 1213.1	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed and designed a	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44) ₁₁₂ =	Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed and designed a	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44) ₁₁₂ =	Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by day (all w Apr ach month 99.07 culated me	es per da 5% if the day atter use, I May Vd,m = far 95.03 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 90.98	erage = designed and ld) Jul Table 1c x 90.98 m x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mor 115.61	Oct 103.11 Total = Su 134.73	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	Ined occurrence of A > 13.9 If A £ 13.9 If average the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of the annual of that 125 If average in the annual of the annual	ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy ipan	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83	[1 - exp ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76	es per da 5% if the orater use, I May $Vd,m = fa$ 95.03 $onthly = 4$.	y Vd,av lwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44	erage = designed and ld) Jul Table 1c x 90.98 m x nm x E 99.56 enter 0 in	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61	Oct 103.11 Total = Sunth (see Tail 134.73 Total = Sunth (see Tail 134.73)	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ined occur if A > 13.9 if A £	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by day (all w Apr ach month 99.07 culated me	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 90.98	erage = designed and ld) Jul Table 1c x 90.98 m x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mor 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the of the office of the off	ay Vd,av lwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44 r storage),	erage = designed and ld) Jul Table 1c x 90.98 m x nm x E 99.56 enter 0 in 14.93	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 103.11 used - cal 148.83 ang at point 22.32 includir	ge in litre usage by day (all we have ach month 129.76 19.46	es per da 5% if the orater use, I May $Vd,m = fa$ 95.03 $onthly = 4$.	ay Vd,av Iwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44 r storage),	erage = designed and ld) Jul Table 1c x 90.98 m x nm x E 99.56 enter 0 in 14.93 storage	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If comi	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volumemunity h	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p reb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss: e (litres) eating a	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	ay Vd,av Iwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44 r storage), 16.12 IWHRS	erage = designed of ld) Jul Table 1c x 90.98 m x nm x E 99.56 enter 0 in 14.93 storage litres in	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 19.46 ag any se ank in dw er (this in	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or Water velling, e	ay Vd,av Iwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44 r storage), 16.12 /WHRS nter 110	erage = designed in designed i	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46) (47)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water a) If m	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 19.46 ng any se ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fact 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 7 90.98 190 x Vd,r 107.44 r storage), 16.12 /WHRS nter 110	erage = designed in designed i	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water storage, kWh/year	(48) x (49) =		C)		(50)
b) If manufacturer's declared cylinder loss factor is not know	n:				' !	
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3		l	C)		(51)
Volume factor from Table 2a		[C)	1	(52)
Temperature factor from Table 2b			C			(53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x ((53) = [C)		(54)
Enter (50) or (54) in (55)			0			(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)$	m			1	
(56)m= 0 0 0 0 0 0	0 0	0	0	0		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)	m where (H	l11) is fror	m Append	ix H	
(57)m= 0 0 0 0 0 0	0 0	0	0	0		(57)
Primary circuit loss (annual) from Table 3			C)		(58)
Primary circuit loss calculated for each month (59)m = (58) ÷	365 × (41)m	•			•	
(modified by factor from Table H5 if there is solar water he	ating and a cylinde	r thermos	stat)			
(59)m =	0 0	0	0	0		(59)
Combi loss calculated for each month (61)m = (60) \div 365 × (41)m					
(61)m= 50.96 46.03 50.96 48.86 48.42 44.87 46.30	6 48.42 48.86	50.96	49.32	50.96		(61)
Total heat required for water heating calculated for each mon	th (62)m = 0.85 ×	(45)m + (4	46)m + ((57)m +	(59)m + (61)m	
(62)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9		185.69	196.38	210.66		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quar	ntity) (enter '0' if no sola	r contribution	on to water	r heating)	l	
(add additional lines if FGHRS and/or WWHRS applies, see				0,		
(63)m= 0 0 0 0 0 0	0 0	0	0	0		(63)
Output from water heater						
(64)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	2 162.67 164.46	185.69	196.38	210.66		
(64)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	02 162.67 164.46 Output from w	<u> </u>			2175.54	(64)
(64)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.93 Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	Output from w	ater heater	(annual) ₁	.12		(64)
	Output from w)m + (61)m] + 0.8 2	ater heater	(annual) ₁	.12		(64) (65)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45	Output from w)m + (61)m] + 0.8 2 9 50.09 50.65	ater heater x [(46)m +	(annual) ₁ + (57)m -	+ (59)m 65.84	1	1
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69	Output from w)m + (61)m] + 0.8 2 9 50.09 50.65	ater heater x [(46)m +	(annual) ₁ + (57)m -	+ (59)m 65.84	1	1
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45 $^{\prime}$ (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):	Output from w)m + (61)m] + 0.8 2 9 50.09 50.65	ater heater x [(46)m +	(annual) ₁ + (57)m -	+ (59)m 65.84	1	1
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the	Output from w)m + (61)m] + 0.8 3 9	ater heater x [(46)m +	(annual) ₁ + (57)m -	+ (59)m 65.84	1	1
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	Output from w)m + (61)m] + 0.8 3 9	ater heater x [(46)m + 57.54 vater is fro	(annual) ₁ + (57)m + 61.23 om comr	+ (59)m 65.84 munity h	1	1
Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the standard form of the stan	Output from w Output	ater heater x [(46)m + 57.54 vater is fro	(annual) ₁ + (57)m 61.23 om comr	+ (59)m 65.84 munity h	1	(65)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Output from w Output	ater heater x [(46)m + 57.54 vater is fro	(annual) ₁ + (57)m 61.23 om comr	+ (59)m 65.84 munity h	1	(65)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 140.82	Output from w)m + (61)m] + 0.8 2 9	ater heater x [(46)m + 57.54 vater is fro Oct 140.82	(annual) 1 + (57)m + 61.23 Dm comr	+ (59)m 65.84 munity h Dec 140.82	1	(65)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)] (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the final state of the final s	Output from w Output	ater heater x [(46)m + 57.54 vater is fro Oct 140.82	(annual) 1 + (57)m + 61.23 Dm comr	+ (59)m 65.84 munity h Dec 140.82	1	(65)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the standard form of the stan	Output from w Output	oct	(annual) 1 + (57)m + (57)m + 61.23 om comr	+ (59)m 65.84 munity h Dec 140.82	1	(65) (66) (67)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45 (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the standard form of the stan	Output from w Output	oct	(annual) 1 + (57)m + (57)m + 61.23 om comr	+ (59)m 65.84 munity h Dec 140.82	1	(65) (66) (67)
Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the standard form of the sta	Output from w Output	oter heater x [(46)m + 57.54] rater is from Oct	(annual) 1 (57) m - 61.23 om comr	+ (59)m 65.84 munity h Dec 140.82 24.92	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)] (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the final state of the first of the firs	Output from w Output	oter heater x [(46)m + 57.54] rater is from Oct	(annual) 1 (57) m - 61.23 om comr	+ (59)m 65.84 munity h Dec 140.82 24.92	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45) (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.65 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 140.82 140.8	Output from w Output	Oct	(annual) 1 + (57)m + (57)m + 61.23 0m comr	+ (59)m 65.84 munity h Dec 140.82 24.92 259.96	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45) (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69 include (57)m in calculation of (65)m only if cylinder is in the final state of the first o	Output from w Output	Oct	(annual) 1 + (57) m + (57) m + 61.23 om common c	+ (59)m 65.84 munity h Dec 140.82 24.92 259.96	1	(65) (66) (67) (68)

Water hea	atina	gains (T	able 5)												
	0.82	88.49	83.64	76.89	71.91	T 6	5.19	60.07	67.	33 70.35	77.33	85.04	88.5]	(72)
Total inte	rnal	gains =		ļ			(66)	m + (67)m	ı + (68	3)m + (69)m + (7	70)m +	(71)m + (72)	m	ı	
	5.27	453.05	437.07	410.92	383.49	3	57.26	340.82	347	.96 362.12	388.5	418.66	441.62]	(73)
6. Solar	gains	S:													
			using sola	r flux from	Table 6a	and	assoc	iated equa	tions	to convert to the	applic	able orientat	ion.		
Orientatio			actor	Area	l		Flu			g_		FF		Gains	
		Table 6d		m²			Tal	ole 6a		Table 6b		Table 6c		(W)	
Northeast (0.9x	0.54	х	10	.73	X	1	1.28	x	0.63	X	0.7	=	25.95	(75)
Northeast (0.9x	0.77	X	2.	17	X	1	1.28	x	0.63	X	0.7	=	7.48	(75)
Northeast (0.9x	0.77	х	3.	3	X	1	1.28	X	0.63	X	0.7	=	11.38	(75)
Northeast (0.9x	0.54	х	10	.73	X	2	2.97	X	0.63	X	0.7	=	52.82	(75)
Northeast (0.9x	0.77	х	2.	17	X	2	2.97	x	0.63	X	0.7	=	15.23	(75)
Northeast (0.9x	0.77	X	3.	3	X	2	2.97	X	0.63	X	0.7	=	23.16	(75)
Northeast (0.9x	0.54	X	10	.73	X	4	1.38	X	0.63	X	0.7	=	95.16	(75)
Northeast (0.9x	0.77	х	2.	17	X	4	1.38	X	0.63	X	0.7	=	27.44	(75)
Northeast (0.9x	0.77	X	3.	3	X	4	1.38	X	0.63	X	0.7	=	41.73	(75)
Northeast (0.9x	0.54	X	10	.73	X	6	7.96	X	0.63	X	0.7	=	156.28	(75)
Northeast ().9x	0.77	X	2.	17	X	6	7.96	x	0.63	X	0.7	=	45.07	(75)
Northeast (0.9x	0.77	x	3.	3	X	6	7.96	x	0.63	X	0.7	_ =	68.54	(75)
Northeast ().9x	0.54	X	10	73	X	9	1.35	x	0.63	X	0.7	=	210.07	(75)
Northeast ().9x	0.77	X	2.	17	X	9	1.35	x	0.63	X	0.7	=	60.58	(75)
Northeast (0.9x	0.77	x	3.	3	X	9	1.35	x	0.63	X	0.7	=	92.12	(75)
Northeast (0.9x	0.54	x	10	.73	X	9	7.38	x	0.63	x	0.7	_ =	223.96	(75)
Northeast (0.9x	0.77	x	2.	17	X	9	7.38	x	0.63	X	0.7	=	64.58	(75)
Northeast (0.9x	0.77	x	3.	3	X	9	7.38	x	0.63	X	0.7	_ =	98.21	(75)
Northeast (0.9x	0.54	x	10	.73	X	9	91.1	x	0.63	x	0.7	_ =	209.51	(75)
Northeast ().9x	0.77	x	2.	17	X	9	91.1	x	0.63	X	0.7	=	60.42	(75)
Northeast (0.9x	0.77	x	3.	3	X	9	91.1	x	0.63	X	0.7	_ =	91.88	(75)
Northeast ().9x	0.54	X	10	73	X	7	2.63	x	0.63	X	0.7	=	167.02	(75)
Northeast (0.9x	0.77	x	2.	17	X	7	2.63	x	0.63	x	0.7		48.16	(75)
Northeast (0.9x	0.77	x	3.	3	X	7	2.63	x	0.63	X	0.7	_ =	73.25	(75)
Northeast (0.9x	0.54	x	10	73	X	5	0.42	x	0.63	x	0.7	_ =	115.95	(75)
Northeast (0.9x	0.77	x	2.	17	X	5	0.42	x	0.63	x	0.7		33.44	(75)
Northeast (0.9x	0.77	x	3.	3	X	5	0.42	x	0.63	x	0.7	=	50.85	(75)
Northeast (0.9x	0.54	x	10	73	X	2	8.07	x	0.63	x	0.7	_ =	64.55	(75)
Northeast (0.9x	0.77	x	2.	17	X	2	8.07	x	0.63	X	0.7	=	18.61	(75)
Northeast ().9x	0.77	x	3.	3	X	2	8.07	x	0.63	j x	0.7	=	28.31	(75)
Northeast ().9x	0.54	x	10	.73	X	,	14.2	x	0.63	X	0.7	=	32.65	(75)
Northeast ().9x	0.77	x	2.	17	X		14.2	x	0.63	X	0.7	=	9.42	(75)

Northeast _{0.9x}	0.77	x	3.3	3	хГ	1	14.2	x	0.63		хГ	0.7		_	14.32	(75)
Northeast _{0.9x}	0.54	x	10.7	73	x [9	9.21	X	0.63		x [0.7		=	21.19	(75)
Northeast _{0.9x}	0.77	x	2.1	7	х		9.21	X	0.63		χ	0.7		=	6.11	(75)
Northeast _{0.9x}	0.77	x	3.3	3	x F	9	9.21	X	0.63		x	0.7	〓	=	9.29	(75)
Southwest _{0.9x}	0.77	x	5.9	8	x Γ	3	6.79		0.63		x	0.7		=	67.24	(79)
Southwest _{0.9x}	0.77	x	5.9	8	х	6	2.67		0.63		x [0.7		=	114.54	(79)
Southwest _{0.9x}	0.77	x	5.9	8	x F	8	5.75	İ	0.63		x	0.7	司	=	156.72	(79)
Southwest _{0.9x}	0.77	X	5.9	8	х	1(06.25	j	0.63		х	0.7	司	=	194.18	(79)
Southwest _{0.9x}	0.77	X	5.9	8	х	1	19.01	İ	0.63		х	0.7	司	=	217.5	(79)
Southwest _{0.9x}	0.77	x	5.9	8	x $\overline{\ }$	11	18.15	j	0.63		x	0.7		=	215.93	(79)
Southwest _{0.9x}	0.77	x	5.9	8	х	1′	13.91	ĺ	0.63		x	0.7		=	208.18	(79)
Southwest _{0.9x}	0.77	x	5.9	8	х	10	04.39		0.63		x	0.7		=	190.78	(79)
Southwest _{0.9x}	0.77	x	5.9	8	x $\overline{\ }$	9	2.85	j	0.63		х	0.7		=	169.69	(79)
Southwest _{0.9x}	0.77	x	5.9	8	х	6	9.27		0.63		x	0.7		=	126.59	(79)
Southwest _{0.9x}	0.77	X	5.9	8	x	4	4.07		0.63		х	0.7		=	80.54	(79)
Southwest _{0.9x}	0.77	x	5.9	8	x $\overline{\ }$	3	1.49	j	0.63		x	0.7		=	57.55	(79)
Northwest _{0.9x}	0.77	X	2.7	9	х	1	1.28	x	0.63		x	0.7		=	9.62	(81)
Northwest _{0.9x}	0.77	X	2.7	9	x $\overline{}$	2	2.97	x	0.63		x	0.7		=	19.58	(81)
Northwest _{0.9x}	0.77	x	2.7	9	x $\overline{\ }$	4	1.38	x	0.63		x [0.7		=	35.28	(81)
Northwest _{0.9x}	0.77	X	2.7	9	х	6	7.96	x	0.63		x	0.7		=	57.94	(81)
Northwest _{0.9x}	0.77	x	2.7	9	x	9	1.35	x	0.63		x	0.7		=	77.89	(81)
Northwest _{0.9x}	0.77	x	2.7	9	х	9	7.38	x	0.63		x	0.7		=	83.04	(81)
Northwest _{0.9x}	0.77	X	2.7	9	х	9	91.1	x	0.63		x	0.7		=	77.68	(81)
Northwest _{0.9x}	0.77	X	2.7	9	x	7	2.63	x	0.63		x	0.7		=	61.93	(81)
Northwest _{0.9x}	0.77	x	2.7	9	х	5	0.42	x	0.63		x [0.7		=	42.99	(81)
Northwest _{0.9x}	0.77	X	2.7	9	x	2	8.07	x	0.63		х	0.7		=	23.93	(81)
Northwest _{0.9x}	0.77	X	2.7	9	x	1	14.2	x	0.63		x	0.7		=	12.11	(81)
Northwest _{0.9x}	0.77	X	2.79	9	x	9	9.21	x	0.63		х	0.7		=	7.86	(81)
Solar gains in								` 	= Sum(74)	-					I	4
(83)m= 121.67	225.33	356.33	522.01	658.16		5.72	647.66	541	.14 412.9	93 2	261.99	149.03	102	2		(83)
Total gains – i			` ´ 		·				.			T			1	(0.1)
(84)m= 576.95	678.38	793.4	932.93	1041.65	1042	2.98	988.47	889	0.1 775.0	04 6	50.48	567.69	543.	62		(84)
7. Mean inter	nal temp	erature	(heating	seasor)											_
Temperature	_	٠.			_			ole 9,	Th1 (°C))					21	(85)
Utilisation fac					r					_		_			ı	
Jan	Feb	Mar	Apr	May	 	un	Jul	 	ug Se		Oct	Nov	De	ec.		4
(86)m= 1	1	0.99	0.98	0.92	0.	8	0.66	0.7	3 0.92	2	0.99	1	1			(86)
Mean interna	l temper	ature in	iving are	ea T1 (f	ollow	ste	ps 3 to 7	in T	able 9c)						1	
(87)m= 19.25	19.41	19.72	20.14	20.55	20.	.84	20.95	20.	92 20.6	7 2	20.15	19.63	19.2	22		(87)
Temperature	during h	eating p	eriods in	rest of	dwe	lling	from Ta	ble 9	9, Th2 (°C	<u> </u>						
(88)m= 19.69	19.69	19.69	19.7	19.7	19.	.71	19.71	19.	71 19.7	1	19.7	19.7	19.	7		(88)

Utilisation factor for gains for rest of dwelling, 12,m (see Table 9a) (89)m= 1 1 0 0.99 0.96 0.88 0.7 0.49 0.57 0.86 0.98 1 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 17.38 17.62 18.06 18.68 19.25 19.6 19.69 19.68 19.42 18.71 17.94 17.35 (90) (80) TLA = Living area + (4) = 0.14 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92)m= 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (93) 8. Space heating requirement Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm. W = (94)m x (84)m (95)m= 57.57 67.18 76.13 871.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.77 14.6 16.6 16.4 14.1 10.6 7.1 4.2 49.65 Heat loss rate for mean internal temperature, Lm. W = (199)m x (193)m x	Utilisation fac	ctor for a	ains for i	rest of dy	vellina. t	n2.m (se	ee Table	9a)						
(90)me 17.38 17.62 18.06 18.68 19.25 19.6 19.69 19.68 19.42 18.71 17.94 17.35 (90) (17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)me 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)me 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Useful gains, hmGm, W = (94)m x (84)m (96)me 57.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loos rate for mean internal temperature, m, W = ((39)m x ((93)m - (96)m) (97)m = 204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x ((97)m - (96)m) (98)m = 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 0 537.1 898.73 1234.05 Fraction of space heat from secondary/supplementary system Total per year (kWh/year) = Sum(98)s. p = 6525.34 (98) Space heating requirements – Individual heating systems including micro-CHP) Space heating from main system (30) (202) = 1 - (201) = 1 (204) (202) = 1 - (201) = 1 (204) (202) = 1 (204) (202) = 1 - (201) = 1 (204) (202) =							1		0.86	0.98	1	1		(89)
(90)me 17.38 17.62 18.06 18.68 19.25 19.6 19.69 19.68 19.42 18.71 17.94 17.35 (90) (17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)me 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)me 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Useful gains, hmGm, W = (94)m x (84)m (96)me 57.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loos rate for mean internal temperature, m, W = ((39)m x ((93)m - (96)m) (97)m = 204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x ((97)m - (96)m) (98)m = 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 0 537.1 898.73 1234.05 Fraction of space heat from secondary/supplementary system Total per year (kWh/year) = Sum(98)s. p = 6525.34 (98) Space heating requirements – Individual heating systems including micro-CHP) Space heating from main system (30) (202) = 1 - (201) = 1 (204) (202) = 1 - (201) = 1 (204) (202) = 1 (204) (202) = 1 - (201) = 1 (204) (202) =	Mean interna	ıl temper	ature in	the rest	of dwelli	na T2 (fo	ollow ste	eps 3 to 7	rin Tabl	e 9c)	<u> </u>	<u> </u>		
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)me 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)me 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (93) 3. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)me 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (95)me 575.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) (97)m = (2204.77) 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x ((97)m - (95)m) x ((41)m (98)m = 1212.42 984.85 863.85 533.75 261.56 0 0 0 0 0 537.1 898.73 1244.05 Total per year (kWh/year) = Sum(98)s = 6526.34 (98) Space heating: Fraction of space heat from secondary/supplementary system including micro-CHP) Space heating: Fraction of total heating from main system 1 (204) = (202) x [1 - (201)] = 1 (204) = (202) x [1 - (201)] = 1 (204) = (202) x [1 - (201)] = 1 (204) = (202) x [1 - (203)] = 1 (204) = (204) = (202) x [1 - (203)] = 1 (204) = (204) = (202) x [1 - (203)] = 1 (204) = (204) = (202) x [1 - (203)] = 1 (204) = (204) = (204) = (202) x [1 - (203)] = 1 (204) =		 				<u> </u>	·	·			17.94	17.35		(90)
92 me 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92)									f	LA = Livin	g area ÷ (4	4) =	0.14	(91)
92 92 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (92)	Mean interna	al temper	ature (fo	r the wh	ole dwel	lina) = fl	LA × T1	+ (1 – fL	A) × T2					
93) 93 17.65 17.87 18.3 18.89 19.43 19.77 19.87 19.85 19.6 18.91 18.18 17.61 (93)		 	<u> </u>			<u> </u>	1			18.91	18.18	17.61		(92)
8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m= 575.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((39)m x [(93)m - (96)m)] (97)m= 2204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 0 537.1 898.73 1234.05 Total per year (kWhiyear) = Sum(98)sv = 6526.34 (98) Space heating: Fraction of space heat from secondary/supplementary system 0 (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, %	Apply adjustr	ment to t	he mean	internal	tempera	ature fro	m Table	4e, whe	ere appro	priate	l .			
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.98 0.95 0.87 0.71 0.52 0.59 0.86 0.97 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m= 575.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, W = ((39)m x ((39)m - (96)m) - (97)m = (2204.77) 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 5 537.1 898.73 1234.05 Total per year (kWh/year) = Sum(98)s. 12 6526.34 (98) Space heating requirement in kWh/m²/year 59.18 (99) 9a. Energy requirements — Individual heating systems including micro-CHP) Space heating: Fraction of space heat from main system 1 (204) = (202) x [1 - (203)] = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, %	(93)m= 17.65	17.87	18.3	18.89	19.43	19.77	19.87	19.85	19.6	18.91	18.18	17.61		(93)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	8. Space hea	ating requ	uirement											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec				•		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)m= 1						Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm , W = (94)m x (84)m (95)m= 575.17 674.18 781.34 890.74 910.1 740 510.5 525.75 665.16 633.79 564.42 542.31 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 2204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 0 57.1 898.73 1234.05 Total per year (kWh/year) = Sum(98)s	Utilisation fac	ctor for g	ains, hm	:										
(95)m=	(94)m= 1	0.99	0.98	0.95	0.87	0.71	0.52	0.59	0.86	0.97	0.99	1		(94)
Monthly average external temperature from Table 8 (96)m= 4.3	Useful gains,	hmGm	W = (94	1)m x (84	4)m									
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 2204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05 Total per year (kWh/year) = Sum(98)s.9.12 Space heating requirement in kWh/m²/year 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) Fraction of total heating from main system 1 (202) = 1 - (201) = 1 (204) = (202) × [1 - (203)] = 1 Efficiency of secondary/supplementary heating system, %	(95)m= 575.17	674.18	781.34	890.74	910.1	740	510.5	525.75	665.16	633.79	564.42	542.31		(95)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m] (97)m = 2204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m = 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05 (98) Space heating requirement in kWh/m²/year 59.18 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (208) Efficiency of secondary/supplementary heating system, %		age exte	rnal tem		from Ta	ble 8								
(97)m= 2204.77 2139.73 1942.47 1632.06 1261.65 838.36 529.73 558.94 893.47 1355.71 1812.65 2200.98 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05 Total per year (kWh/year) = Sum(98) _{189.12} = 6526.34 (98) Space heating requirement in kWh/m²/year 59.18 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208)											7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05 Total per year (kWh/year) = Sum(98) _{1.59.12} = 6526.34 (98) Space heating requirement in kWh/m²/year Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0							-``		<u> </u>					(07)
(98)m= 1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 6526.34 (98) Space heating requirement in kWh/m²/year	` '											2200.98		(97)
Total per year (kWh/year) = Sum(98) _{159.12} = 6526.34 (98) Space heating requirement in kWh/m²/year 59.18 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, %							i e				·	1234.05		
Space heating requirement in kWh/m²/year 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % [99] [99] [99] [99] [99] [90] [9	(90)111= 1212.42	304.03	003.00	333.73	201.50	U					<u> </u>	L	6526.34	7(98)
9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208)	Space heating	na reauire	ement in	k\/\/h/m²	/vear			Tota	i per year	(KVVII/yeai) = 3um(9	O)15,912 —		╡ .
Space heating:Fraction of space heat from secondary/supplementary system0(201)Fraction of space heat from main system(s) $(202) = 1 - (201) =$ 1(202)Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ 1(204)Efficiency of main space heating system 193.4(206)Efficiency of secondary/supplementary heating system, %0(208)	·				•	:		:	YUD)				39.10	
Fraction of space heat from secondary/supplementary system O (201) Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % O (202) = $1 - (201) =$ 1 (202) Efficiency of secondary/supplementary heating system, % O (208)			its — Indi	viduai n	eating sy	/stems i	ncluaing	micro-C	HP)					
Fraction of space heat from main system(s) $ (202) = 1 - (201) = $ $ (202) = 1 - (201) = $ $ (204) = (202) \times [1 - (203)] = $ $ (204) = (202) $	•	•	t from se	econdar	//supple	mentarv	svstem					ĺ	0	(201)
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, %	·					,	•	(202) = 1 -	- (201) =					╡
Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208)	·			•	` '			(204) = (20	02) × [1 –	(203)] =				╡
Efficiency of secondary/supplementary heating system, % 0 (208)			_	•									93.4	╡
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWb/year	Efficiency of	seconda	ry/supple	ementar	y heating	g system	າ, %						0	(208)
can rob mar ripr may can rag cop cot rov boo krimyoar	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊐ ar
Space heating requirement (calculated above)	Space heating	ng require	ement (c	alculated	d above)								·	
1212.42 984.85 863.88 533.75 261.56 0 0 0 0 537.1 898.73 1234.05	1212.42	984.85	863.88	533.75	261.56	0	0	0	0	537.1	898.73	1234.05		
$(211)m = \{[(98)m \times (204)] \} \times 100 \div (206) $ (211)	(211)m = {[(98	3)m x (20	4)] } x 1	00 ÷ (20	16)									(211)
1298.1 1054.45 924.92 571.47 280.04 0 0 0 575.06 962.24 1321.25	1298.1	1054.45	924.92	571.47	280.04	0	0	0	0	575.06	962.24	1321.25		
Total (kWh/year) = Sum(211) _{15,1012} = 6987.52 (211)					•			Tota	l (kWh/yea	ar) =Sum(2	211),5,1012	F	6987.52	(211)
Space heating fuel (secondary), kWh/month	Space heating	ng fuel (s	econdar	y), kWh/	month							'		
$= \{[(98)m \times (201)]\} \times 100 \div (208)$	$= \{[(98) \text{m x } (20)]\}$	01)] } x 1	00 ÷ (20	8)			T				.			
(215)m= 0 0 0 0 0 0 0 0 0 0 0 0	(215)m= 0	0	0	0	0	0	0		_					_
Total (kWh/year) = Sum(215) _{15,1012} 0 (215)								Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)

215.87 190.26 199.79 178.61 172.93 1	152.3 145.92	162.67	164.46	105.60	106.20	240.66		
	152.3 145.92	162.67	164.46	185.69	196.38	210.66		٦,,
Efficiency of water heater	000 1 000		00.0	07.57	00.44	00.77	80.3	(2
	80.3 80.3	80.3	80.3	87.57	88.41	88.77		(2
uel for water heating, kWh/month 219)m = (64)m x 100 ÷ (217)m								
·	89.67 181.72	202.57	204.81	212.04	222.14	237.31	ı	
		Total	= Sum(2	19a) ₁₁₂ =			2539.24	(2
Annual totals				k\	Wh/year	, 	kWh/year	7
Space heating fuel used, main system 1						Į	6987.52]
Vater heating fuel used							2539.24	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(2
boiler with a fan-assisted flue						45		(2
otal electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(2
Electricity for lighting						Ī	428.18	(2
12a. CO2 emissions – Individual heating systems	s including mi	cro-CHP				-		
	Energy			Emiss	ion fac	tor	Emissions	
				kg CO	2/kWh		kg CO2/yea	r
	kWh/year						1509.3	(2
Space heating (main system 1)	kWh/year			0.2	16	= [1,
Space heating (main system 1) Space heating (secondary)	•			0.2		= [0] (2
	(211) x				19	L]](2
Space heating (secondary)	(211) x (215) x	+ (263) + (2	264) =	0.5	19	= [0	_
Space heating (secondary) Vater heating Space and water heating	(211) x (215) x (219) x	+ (263) + (2	264) =	0.5	19	= [0 548.48](2](2](2
Space heating (secondary) Vater heating	(211) x (215) x (219) x (261) + (262)	+ (263) + (2	264) =	0.5	19 16 19	= [0 548.48 2057.78](2](2

TER =

(273)

21.03

			l Iser I	Details:						
Assessor Name:	Chris Hockr	aoll	03011	Strom	o Num	hori		STD()	016363	
Software Name:	Stroma FSA			Softwa					on: 1.0.4.10	
			Property	Address						
Address :										
1. Overall dwelling dime	ensions:									
Danamant				ea(m²)			ight(m)	1,- ,	Volume(m³)	_
Basement				74.06	(1a) x	2	2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1	1d)+(1e)+(<i>1</i>	n)	74.06	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:										
	main heating	seconda heating		other		total			m³ per hou	ſ
Number of chimneys	0	+ 0	+	0	= [0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	= +	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent fa	ıns	J L			, <u> </u>	3	x -	10 =	30	(7a)
Number of passive vents	;				F	0	x -	10 =	0	
Number of flueless gas f					F	0	X 4	40 =	0	(7c)
ramber of fideless gas fi					L				0	(/ C)
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fa	ns = (6a)+(6b)+	(7a)+(7b)+	(7c) =	Г	30		÷ (5) =	0.16	(8)
If a pressurisation test has b	peen carried out or l	is intended, proce	ed to (17),	otherwise o	continue fr	om (9) to (_
Number of storeys in t	he dwelling (ns))							0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0 if both types of wall are p					•	uction			0	(11)
deducting areas of openi	•	, ,	to the grea	ner wan are	a (anoi					
If suspended wooden	floor, enter 0.2	(unsealed) or	0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•								0	(13)
Percentage of window	s and doors dra	ught stripped		0.05 10.6	(4.4) 4	001			0	(14)
Window infiltration				0.25 - [0.2]	, ,	00] = 2) + (13) -	ı (15) —		0	(15)
Infiltration rate Air permeability value,	α50 evnresse	d in cubic met	as nar h					area	0	(16)
If based on air permeabil				•	•	elle oi e	ilvelope	aica	0.41	(17)
Air permeability value applie	-					is being us	sed		0.41	()
Number of sides sheltered	ed								2	(19)
Shelter factor				(20) = 1 -		9)] =			0.85	(20)
Infiltration rate incorpora				(21) = (18) x (20) =				0.34	(21)
Infiltration rate modified f		'	 	1 .			·	_	1	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp				1 0-	4	1.0	1.5	4 -	1	
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

0.44	0.43	0.42	0.38	0.37	d wind s	0.33	0.32	0.34	0.37	0.39	0.41	7		
Calculate effec		-					0.32	0.34	0.37	0.59	0.41	_		
If mechanica	al ventilati	on:											0	(2
If exhaust air he	eat pump us	sing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)				0	(2
If balanced with	heat recove	ery: effic	eiency in %	allowing f	or in-use f	actor (fron	n Table 4h) =					0	(2
a) If balance	d mechar	nical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2)	2b)m + (2	23b) × [1 – (23c) ÷ 100]	
4a)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
b) If balance			entilation			covery (I	MV) (24b	ŕ	r `			7		
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	_		(2
c) If whole he if (22b)m	ouse extra $1 < 0.5 \times ($			•	•				.5 × (23b)				
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0	7		(2
d) If natural	ventilatior	n or wh	ole hous	e positi	ve input	ventilatio	on from I	loft			·	_		
if (22b)m	n = 1, ther	n (24d)	m = (221)	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			_		
4d)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58			(2
Effective air	change ra	ate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)	,			-		
5)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58			(
. Heat losse	s and hea	at loss p	paramete	er:										
LEMENT	Gross area (r		Openin m		Net Ar		U-val		AXU	~	k-valu			X k /K
		111 <i>)</i>	- 11	I	Α,ι	11-	vv/m∠	ĽΚ.	(VV/r	<)	kJ/m ² •	K	KJ	/ f\
oors		· · · · · ·	11	-	A ,r	x	W/m2		(W/ł	<) 	kJ/m²-	K	KJ	
	e 1	··· <i>)</i>	"	F		x		=	,	ζ) 	kJ/m²•	K	KJ	(:
indows Type		··· <i>)</i>	II	-	2.6	x x1	1	= 0.04] =	2.6	() 	kJ/m²•	K	KJ	(:
indows Type indows Type	2	,,,	II		2.6	x x1 x1	<u>1</u> /[1/(1.4)+	= (0.04] = (0.04] =	2.6	\) 	kJ/m²-	K	KJ	(:
indows Type indows Type indows Type	2 3	,,,	"		2.6 2.52 3.05 4.26	x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] =	2.6 3.34 4.04 5.65	\$) 	kJ/m²-	K	KJ	(; (; (;
indows Type indows Type indows Type indows Type	2 3	,,	"		2.6 2.52 3.05 4.26 0.5	x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] = 0.04] =	2.6 3.34 4.04 5.65 0.66		kJ/m²-	K	K.J	(1)
oors findows Type findows Type findows Type findows Type foor falls Type1	2 2 3 4				2.6 2.52 3.05 4.26 0.5	x x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097		kJ/m²-	K 	KJ	(2 (2 (2 (2
indows Type indows Type indows Type indows Type oor alls Type1	67.78		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88	x x1 x1 x1 x1 x1 x1 x2 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097 9.34		kJ/m²-	K 	KJ	
indows Type indows Type indows Type indows Type oor alls Type1 alls Type2	67.78		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	= 0.04] = 0.04	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94		kJ/m²-	K 	KJ	
indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3	67.78 67.78 24.47 5.93		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87	x x1 x1 x1 x1 x1 x2 x x x x x x x	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097 9.34		kJ/m²-	K 	KJ	
indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3 otal area of e	67.78 67.78 24.47 5.93		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93	x x1 x1 x1 x1 x1 x2 x x x x x x x x	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07		kJ/m²-	K 	KJ	
indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3 otal area of e	67.78 67.78 24.47 5.93		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8	x x1 x1 x1 x1 x1 x2 x x x x x x x x x x	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	= 0.04] = 0.04	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94		kJ/m²-	K 		
indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor	67.78 67.78 24.47 5.93		15.9		2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8 12.38	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07		kJ/m²-	K 		
indows Type indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and	67.78 67.78 24.47 5.93 Elements, I	m²	15.9 2.6 0	indow U-va	2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07					
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 atal area of e arty wall arty floor arty ceiling or windows and include the area	67.78 67.78 24.47 5.93 Lements, I	m² ws, use e	15.9 2.6 0	indow U-va	2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07					
indows Type indows Type indows Type indows Type indows Type oor falls Type1 falls Type2 falls Type3 otal area of e arty wall farty floor farty ceiling or windows and include the area fabric heat los	67.78 67.78 24.47 5.93 Lements, I	m² ws, use edides of ir	15.9 2.6 0	indow U-va	2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18	= 0.04] = 0.04	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07 0	s given in	paragrap	h 3.2	9.93	
indows Type indows Type indows Type indows Type indows Type oor alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and include the area	67.78 67.78 24.47 5.93 See a control of window as on both sizes, W/K = Cm = S(A)	m² ws, use e ides of ir S (A x	15.9 2.6 0	ndow U-va	2.6 2.52 3.05 4.26 0.5 14.69 51.88 21.87 5.93 112.8 12.38 59.37 74.06 alue calculatitions	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18 0.18	= 0.04] = 0.04	2.6 3.34 4.04 5.65 0.66 1.9097 9.34 3.94 1.07		paragrap	h 3.2		

	at loss							(33) +	` '			55.5	(3
entilation he	at loss ca	alculated	l monthly	/				` ,	= 0.33 × (25)m x (5)	·		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 37.92	37.68	37.44	36.35	36.14	35.18	35.18	35.01	35.55	36.14	36.56	36.99		(3
eat transfer	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m= 93.41	93.18	92.94	91.84	91.64	90.68	90.68	90.5	91.05	91.64	92.05	92.49	ı	
_									•	Sum(39) ₁ .	12 /12=	91.84	(3
eat loss para	ı i							· ,	= (39)m ÷	·			
0)m= 1.26	1.26	1.25	1.24	1.24	1.22	1.22	1.22	1.23	1.24	1.24	1.25		–
umber of day	vs in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.24	(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
, <u> </u>													
. Water hea	ting ener	rav roqui	rement:								kWh/ye	ar:	
. Water nea	urig erier	igy requi	rement.								KVVII/ y C	rai.	
sumed occi											34		(4
if TFA > 13.		+ 1.76 x	[1 - exp	(-0.0003	49 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	ΓFA -13.	9)			
if TFA £ 13. nual averag	•	ator usac	no in litro	s per da	v Vd av	orago –	(25 v NI)	+ 36			70		
duce the annu									se target o		.79		(4
t more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot water usage i	n litres per	day for ea				Table 1c x		•		ı			
4)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
								-	Γotal = Su	l m(44) ₁₁₂ =		1077.45	(4
nergy content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	0Tm / 3600	kWh/mor	th (see Ta	ables 1b, 1	c, 1d)		_
	T I	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
5)m= 146.47	128.1	4 ,					l			<u> </u>			┪.
5)m= 146.47	128.1							-	Fotal = Su	m(45) ₁₁₂ =	=	1412.71	(4
,	<u> </u>	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46 _,		Γotal = Su	m(45) ₁₁₂ =	=	1412.71	(4
nstantaneous v	<u> </u>	ng at point 19.83	of use (no	hot water	storage),	enter 0 in 13.26	boxes (46)		Total = Sui 17.95	m(45) ₁₁₂ =	21.28	1412.71	_
nstantaneous v S)m= 21.97 ater storage	vater heatir 19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	· ·		1412.71	_
nstantaneous v s)m= 21.97 ater storage	vater heatir 19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59		1412.71	(4
nstantaneous v S)m= 21.97 ater storage orage volum community h	19.22 loss: ne (litres)	19.83 includin	17.29 Ing any so	16.59 Dlar or W	14.31 /WHRS nter 110	13.26 storage litres in	15.22 within sa (47)	15.4 ame ves	17.95 Sel	19.59	21.28	1412.71	(4
nstantaneous v 5)m= 21.97 rater storage rorage volum community h	19.22 loss: ne (litres) neating a	19.83 includin	17.29 Ing any so	16.59 Dlar or W	14.31 /WHRS nter 110	13.26 storage litres in	15.22 within sa (47)	15.4 ame ves	17.95 Sel	19.59	21.28	1412.71	(4
nstantaneous v S)m= 21.97 ater storage orage volum community h therwise if neater storage	19.22 19.22 10ss: ne (litres) neating a o stored	19.83 including and no tall hot water	17.29 ag any so	16.59 blar or W relling, e cludes i	14.31 /WHRS nter 110	13.26 storage litres in neous co	15.22 within sa (47)	15.4 ame ves	17.95 Sel	19.59	21.28	1412.71	(4
nstantaneous v 5)m= 21.97 ater storage orage volum community h therwise if no ater storage) If manufac	19.22 19.22 19.22 19.22 19.20	19.83 including the indicate the indicate indica	17.29 Ing any so ank in dwar (this in oss factors)	16.59 blar or W relling, e cludes i	14.31 /WHRS nter 110	13.26 storage litres in neous co	15.22 within sa (47)	15.4 ame ves	17.95 Sel	19.59	21.28	1412.71	(4
nstantaneous v S)m= 21.97 ater storage orage volum community h cherwise if neater storage of the manufacter storage of the manufacter storage of the manufacter storage	19.22 19.22 10ss: ne (litres) neating a o stored 10ss: turer's defactor froi	19.83 including no tath hot water eclared loans and mable	17.29 ag any so nk in dw r (this in oss facto 2b	16.59 plar or W relling, e cludes in	14.31 /WHRS nter 110	storage litres in neous co n/day):	15.22 within sa (47) embi boil	15.4 15.4 ame vessers) ente	17.95 Sel	19.59	21.28	1412.71	(4)
instantaneous voices storage volume community had been storage with the rwise if not attention and the responsibilities of the	19.22 loss: ne (litres) neating a o stored loss: turer's defactor from	19.83 including and no tath hot water eclared to make a storage	17.29 ag any so ank in dwer (this in oss factor 2b , kWh/ye	16.59 plar or Warelling, e cludes in the control of the control o	14.31 /WHRS nter 110 nstantar	storage litres in neous co n/day):	15.22 within sa (47)	15.4 15.4 ame vessers) ente	17.95 Sel	19.59	21.28	1412.71	(4)
nstantaneous voices at er storage volume therwise if new tater storage of the manufacture for the ergy lost from the manufacture of the ergy lost from the ergy lost	19.22 19.22	19.83 including the following	17.29 ag any so ank in dwar (this in oss factor 2b , kWh/ye cylinder I	16.59 Dlar or Welling, ecludes in the control of t	14.31 /WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	15.22 within sa (47) embi boil	15.4 15.4 ame vessers) ente	17.95 Sel	19.59 47)	21.28 0 0 0	1412.71	(4)
nstantaneous v S)m= 21.97 ater storage orage volum community h cherwise if neater storage of manuface emperature f nergy lost fro of manuface of water stor	19.22 19.22 10ss: ne (litres) neating a to stored loss: turer's defeater from water turer's defeater loss	19.83 including the including	17.29 ag any so the index of this index of the index of	16.59 Dlar or Welling, ecludes in the control of t	14.31 /WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	15.22 within sa (47) embi boil	15.4 15.4 ame vessers) ente	17.95 Sel	19.59 47)	21.28	1412.71	(4 (4 (4 (\$
nstantaneous v instantaneous v instant	19.22 loss: ne (litres) neating a o stored loss: turer's de factor froi om water turer's de age loss neating s	19.83 including and no tale hot water eclared to make eclared to factor from the eclared contact of the eclared c	17.29 ag any so the index of this index of the index of	16.59 Dlar or Welling, ecludes in the control of t	14.31 /WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	15.22 within sa (47) embi boil	15.4 15.4 ame vessers) ente	17.95 Sel	19.59	21.28 0 0 0	1412.71	(4 (4 (4 (5)
nstantaneous voices are storage volume therwise if nearer storage of manufacture for the storage of the storage	19.22 19.22 10ss: ne (litres) neating a stored loss: turer's defactor from water turer's defage loss neating suffrom Tali	19.83 including and no tale hot water eclared to the storage eclared of factor from the section of the section	ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl	16.59 Dlar or Welling, ecludes in the control of t	14.31 /WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	15.22 within sa (47) embi boil	15.4 15.4 ame vessers) ente	17.95 Sel	47)	21.28 0 0 0 0	1412.71	(4)
instantaneous v	19.22 19.22	19.83 including and no tale hot water eclared to make eclared to factor from the eclared control from the eclared contro	ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl on 4.3	olar or Welling, ecludes in the correct of the corr	14.31 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day):	15.22 within sa (47) embi boil	15.4 ame vessers) ente	17.95 sel er 'O' in (19.59	21.28 0 0 0 0	1412.71	(2

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	55 × (41)	m				•	
(modified by	y factor f	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	•	•				•	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	39.7	44.49	44.99	51.46	55.17	59.75		(65)
						l	77.70	55	31.40	33.17	39.73		(33)
include (57)	m in cal	culation o	of (65)m		<u> </u>	<u> </u>						l eating	(55)
include (57) 5. Internal g				only if c	<u> </u>	<u> </u>						eating	(00)
5. Internal g	ains (see	e Table 5	and 5a	only if c	<u> </u>	<u> </u>						eating	(65)
` '	ains (see	e Table 5	and 5a	only if c	<u> </u>	<u> </u>						eating	
5. Internal g	ains (see	Table 5	and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	eating	(66)
5. Internal g Metabolic gain Jan	ains (see ns (Table Feb 117.03	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	only if controls: May 117.03	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 117.03	ains (see ns (Table Feb 117.03	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	only if controls: May 117.03	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	ns (Table Feb 117.03 (calcula	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equati 7.54	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44	ns (Table Feb 117.03 (calcula 16.38	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equati 7.54	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga	res (Table Feb 117.03 (calcula 16.38 tims (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equati 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58	res (Table Feb 117.03 (calcula 16.38 tims (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equati 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains	res (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 s (calcula 34.7	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equati 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 See Ta 157.81 ee Table	Oct 117.03 15.23 ble 5 169.31	Nov 117.03 17.78	Dec 117.03 18.95	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	res (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 s (calcula 34.7	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equati 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 See Ta 157.81 ee Table	Oct 117.03 15.23 ble 5 169.31	Nov 117.03 17.78	Dec 117.03 18.95	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3	res (Table Feb 117.03 (calcula 16.38 calcula 34.7 rs gains 3	ted in Apulated in	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equati 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	res (Table Feb 117.03 (calcula 16.38 calcula 34.7 rs gains 3	ted in Apulated in	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equati 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. e	res (Table Feb 117.03 (calcula 16.38 tins (calcula 34.7 res gains 3 vaporatio 1-93.62	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negat	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 1, also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. et (71)m= -93.62	res (Table Feb 117.03 (calcula 16.38 tins (calcula 34.7 res gains 3 vaporatio 1-93.62	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negat	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 1, also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. et (71)m= -93.62 Water heating	res (Table Feb 117.03 (calcula 16.38 tins (calcula 34.7 res gains 3 vaporatio 79.68	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negat -93.62 Table 5) 74.76	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if construction only if construction only if construction on the construction of the construction on the construction of the construction on the construction of the construction on the construction of	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 3 le 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 1, also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3	Dec 117.03 18.95 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)
Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. et (71)m= -93.62 Water heating (72)m= 82.37	res (Table Feb 117.03 (calcula 16.38 tins (calcula 34.7 res gains 3 vaporatio 79.68	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negat -93.62 Table 5) 74.76	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if construction only if construction only if construction on the construction of the construction on the construction of the construction on the construction of the construction on the construction of	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 3 le 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 1, also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3	Dec 117.03 18.95 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.52	x	11.28	x	0.63	x	0.7] =	17.38	(75)
Northeast 0.9x 0.77	x	3.05	x	11.28	x	0.63	х	0.7	=	21.03	(75)
Northeast 0.9x 0.77	x	2.52	x	22.97	x	0.63	х	0.7	=	35.38	(75)
Northeast 0.9x 0.77	x	3.05	x	22.97	x	0.63	x	0.7] =	42.82	(75)
Northeast 0.9x 0.77	x	2.52	x	41.38	x	0.63	х	0.7	=	63.74	(75)
Northeast 0.9x 0.77	x	3.05	x	41.38	x	0.63	х	0.7	=	77.14	(75)
Northeast 0.9x 0.77	x	2.52	x	67.96	x	0.63	х	0.7	=	104.67	(75)
Northeast _{0.9x} 0.77	x	3.05	x	67.96	x	0.63	x	0.7	=	126.69	(75)
Northeast _{0.9x} 0.77	x	2.52	x	91.35	x	0.63	х	0.7	=	140.7	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.35	X	0.63	х	0.7	=	170.29	(75)
Northeast _{0.9x} 0.77	x	2.52	x	97.38	x	0.63	x	0.7	=	150	(75)
Northeast _{0.9x} 0.77	x	3.05	x	97.38	x	0.63	х	0.7	=	181.55	(75)
Northeast _{0.9x} 0.77	X	2.52	x	91.1	X	0.63	х	0.7	=	140.32	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.1	X	0.63	х	0.7	=	169.83	(75)
Northeast 0.9x 0.77	x	2.52	x	72.63	x	0.63	х	0.7	=	111.87	(75)
Northeast 0.9x 0.77	x	3.05	x	72.63	x	0.63	х	0.7	=	135.39	(75)
Northeast _{0.9x} 0.77	x	2.52	x	50.42	X	0.63	х	0.7	=	77.66	(75)
Northeast 0.9x 0.77	x	3.05	x	50.42	x	0.63	х	0.7	=	94	(75)
Northeast 0.9x 0.77	x	2.52	x	28.07	x	0.63	х	0.7	=	43.23	(75)
Northeast 0.9x 0.77	x	3.05	x	28.07	x	0.63	х	0.7	=	52.32	(75)
Northeast 0.9x 0.77	x	2.52	x	14.2	x	0.63	x	0.7	=	21.87	(75)
Northeast 0.9x 0.77	x	3.05	x	14.2	x	0.63	х	0.7	=	26.47	(75)
Northeast _{0.9x} 0.77	X	2.52	x	9.21	X	0.63	х	0.7	=	14.19	(75)
Northeast _{0.9x} 0.77	x	3.05	x	9.21	X	0.63	х	0.7	=	17.18	(75)
Southwest _{0.9x} 0.77	x	4.26	x	36.79]	0.63	x	0.7	=	47.9	(79)
Southwest _{0.9x} 0.77	x	0.5	x	36.79]	0.63	x	0.7	=	5.62	(79)
Southwest _{0.9x} 0.77	x	4.26	x	62.67]	0.63	х	0.7	=	81.6	(79)
Southwest _{0.9x} 0.77	x	0.5	x	62.67]	0.63	x	0.7	=	9.58	(79)
Southwest _{0.9x} 0.77	x	4.26	x	85.75		0.63	x	0.7	=	111.64	(79)
Southwest _{0.9x} 0.77	x	0.5	x	85.75]	0.63	x	0.7	=	13.1	(79)
Southwest _{0.9x} 0.77	x	4.26	x	106.25		0.63	x	0.7	=	138.33	(79)
Southwest _{0.9x} 0.77	x	0.5	x	106.25]	0.63	x	0.7	=	16.24	(79)
Southwest _{0.9x} 0.77	x	4.26	x	119.01		0.63	x	0.7	=	154.94	(79)
Southwest _{0.9x} 0.77	x	0.5	x	119.01]	0.63	x	0.7	=	18.19	(79)
Southwest _{0.9x} 0.77	x	4.26	x	118.15]	0.63	х	0.7	=	153.82	(79)
Southwest _{0.9x} 0.77	x	0.5	x	118.15]	0.63	х	0.7	=	18.05	(79)
Southwest _{0.9x} 0.77	x	4.26	x	113.91]	0.63	х	0.7] =	148.3	(79)
Southwest _{0.9x} 0.77	x	0.5	x	113.91]	0.63	x	0.7	=	17.41	(79)
Southwest _{0.9x} 0.77	X	4.26	x	104.39]	0.63	X	0.7	=	135.91	(79)

Southwest _{0.9x}	0.77	X	0.	5	x	10	04.39]		0.63	x	0.7	=	15.95	(79)
Southwest _{0.9x}	0.77	x	4.2	26	x	9	2.85]		0.63	x [0.7	=	120.88	(79)
Southwest _{0.9x}	0.77	x	0.	5	x	9	2.85			0.63	x	0.7	=	14.19	(79)
Southwest _{0.9x}	0.77	x	4.2	26	x	6	9.27]		0.63	x [0.7	=	90.18	(79)
Southwest _{0.9x}	0.77	x	0.	5	x	6	9.27]		0.63	x [0.7	=	10.58	(79)
Southwest _{0.9x}	0.77	x	4.2	26	x	4	4.07			0.63	x	0.7	=	57.38	(79)
Southwest _{0.9x}	0.77	x	0.	5	x	4	4.07			0.63	x	0.7	=	6.73	(79)
Southwest _{0.9x}	0.77	×	4.2	26	x	3	1.49]		0.63	x	0.7		40.99	(79)
Southwest _{0.9x}	0.77	x	0.	5	x	3	1.49			0.63	x	0.7	=	4.81	(79)
					_										
Solar gains ir	n watts, c	alculated	I for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 91.94	169.36	265.62	385.92	484.12	50	3.42	475.86	399.	.12	306.73	196.32	112.44	77.18		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts	•	•			•		-	
(84)m= 460.44	535.26	618.13	717.23	793.94	79	2.46	751.75	681.	.37	600.13	511.13	451.77	435.01		(84)
7. Mean inte	ernal temi	oerature	(heating	season)										
Temperatur			, ,			area f	rom Tab	ole 9.	. Th	1 (°C)				21	(85)
Utilisation fa	_	٠.			•			,	,	. (•)					(22)
Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	1	
(86)m= 1	0.99	0.99	0.95	0.85	_	.68	0.52	0.5	Ť	0.84	0.98	1	1	1	(86)
Moon intern	ol tompo	roturo in	livina or	00 T1 /f/	حالم	w oto	no 2 to 7	 7 in T	- L	. 00)		1		J	
Mean intern (87)m= 19.63		20.08	20.46	20.78	_	w Ste	20.99	20.9	_	20.85	20.43	19.97	19.61	1	(87)
` /					<u> </u>			<u> </u>			20.40	10.07	10.01]	(0.)
Temperatur	T			1		Ť			$\overline{}$	<u> </u>		1		1	
(88)m= 19.87	19.87	19.88	19.89	19.89	1	9.9	19.9	19.	.9	19.9	19.89	19.89	19.88]	(88)
Utilisation fa	ctor for g	ains for	rest of d	welling,	h2,r	m (se	e Table	9a)						_	
(89)m= 1	0.99	0.98	0.93	0.8	0	.58	0.4	0.4	16	0.77	0.96	0.99	1		(89)
Mean intern	al tempe	rature in	the rest	of dwelli	na .	T2 (fc	ollow ste	eps 3	to 7	' in Tabl	e 9c)				
(90)m= 18.06	18.3	18.72	19.27	19.68	Ť	9.87	19.9	19.8	$\overline{}$	19.78	19.23	18.56	18.03]	(90)
					<u> </u>				!	f	LA = Livi	ng area ÷ (4	4) =	0.26	(91)
Mana into wa	-1 4		مار در مراک در	-ll	II:	\ £1	Λ Τ4	. /4	£I	۸) T O					
Mean intern (92)m= 18.47		19.07	19.58	19.97	T)) = 1L 0.15	20.18	T		A) × 12 20.06	10.55	18.93	10.44	1	(92)
` ′				<u> </u>				20.			19.55	16.93	18.44	J	(92)
Apply adjust (93)m= 18.47	1	19.07	19.58	19.97	_	0.15	20.18	20.		20.06	19.55	18.93	18.44	1	(93)
8. Space he				19.91		J. 13	20.10	20.	10	20.00	19.00	10.93	10.44		(30)
Set Ti to the				ro obtoir	vod.	at etc	on 11 of	Tabl	o Oh	oo tha	t Ti m-	(76)m an	d ro col	oulato	
the utilisatio			•		ieu	ai Sie	sp i i oi	I abi	e ar), 50 illa	t 11,111=	(10)III aII	u re-can	Julate	
Jan	Feb	Mar	Apr	May	Γ	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec]	
Utilisation fa				<u> </u>					3 1	1		1		1	
(94)m= 1	0.99	0.98	0.93	0.81	0	.61	0.43	0.4	19	0.78	0.96	0.99	1]	(94)
Useful gains	s, hmGm	, W = (9 ⁴	4)m x (8	4)m								1	<u> </u>	J	
(95)m= 458.27	530.04	603.03	664.71	640.01	48	0.72	321.53	335.	.62	469.48	489.2	447.6	433.42]	(95)
Monthly ave	rage exte	ernal tem	perature	from Ta	able	e 8						1		4	
(96)m= 4.3	4.9	6.5	8.9	11.7		4.6	16.6	16.	.4	14.1	10.6	7.1	4.2]	(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m]		•	•	
(97)m= 1323.8	3 1285.19	1168.62	981	757.9	50	3.32	324.9	342.	.02	542.41	819.96	1088.58	1317.12]	(97)
	-											_		_	

Space heating requir	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m				
(98)m= 643.98 507.46	420.8	227.73	87.72	0	0	0	0	246.08	461.51	657.47		_	
						Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	3252.74	(98)	
Space heating require	ement in	kWh/m²	/year								43.92	(99)	
9a. Energy requireme	nts – Ind	ividual h	eating sy	ystems i	ncluding	g micro-C	CHP)						
Space heating:	ot from c	ocondor	v/cupple	montary	cyctom					г	0	(201)	
•	Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) (202) = 1 - (201) =												
Tradition of opaso from main bystem(b)												(202)	
	Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] = Efficiency of main space heating system 1												
Efficiency of seconda				a evetom	0/-					F	93.4	(206)	
	· · ·				i	Ι	0	0-4	Nan	L Daa		`	
Jan Feb Space heating requir	Mar ement (c	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear	
643.98 507.46	420.8	227.73	87.72	0	0	0	0	246.08	461.51	657.47			
(211)m = {[(98)m x (20	 (4)] } x 1	00 ÷ (20)6)	<u>l</u>	<u>I</u>	!	<u>I</u>	<u>I</u>	<u>l</u>			(211)	
689.48 543.32	450.54	243.82	93.92	0	0	0	0	263.47	494.12	703.93			
		•				Tota	l (kWh/yea	ar) =Sum(2	211)	=	3482.6	(211)	
Space heating fuel (s		• •	month							_			
= {[(98)m x (201)] } x 1	ĭ	ľ											
(215)m= 0 0	0	0	0	0	0	0 Tota	0 I (kWh/yea	0 er) =Sum('	0	0		(215)	
Water heating						Tota	ii (KVVII/yCc	ar) =00m(2	10)15,101	<u> </u>	0	(213)	
Output from water hea	ter (calc	ulated al	bove)										
196.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18			
Efficiency of water hea	iter										80.3	(216)	
(217)m= 87.81 87.61	87.13	85.96	83.7	80.3	80.3	80.3	80.3	86.04	87.35	87.9		(217)	
Fuel for water heating $(219)m = (64)m \times 100$													
(219)m= 224.11 196.22	205.28	184.55	183.5	168.46	161.4	179.92	181.91	193.33	203.28	218.63			
						Tota	I = Sum(2	19a) ₁₁₂ =		'	2300.57	(219)	
Annual totals								k'	Wh/yeaı	· _	kWh/yea		
Space heating fuel use	ed, main	system	1							L	3482.6	╛	
Water heating fuel use	ed										2300.57		
Electricity for pumps, f	ans and	electric	keep-ho	t									
central heating pump	:									30		(230	
boiler with a fan-assis	sted flue									45		(230	
Total electricity for the	above, I	kWh/yea	r			sum	of (230a).	(230g) =			75	(231)	
Electricity for lighting	•	,								L [325.7	(232)	
												· · · · · ·	

Energy

kWh/year

Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216	=	752.24	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	496.92	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1249.16	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	169.04	(268)
Total CO2, kg/year	sum (of (265)(271) =		1457.13	(272)

TER = 19.67 (273)

		User D	Notaile:						
A a a a a a a a a a a a a a a a a a a a	Obada Harabarall	USELL		- 11			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 on: 1.0.4.10	
Software Hame.		Property	Address				VCISIO	ni. 1.0. 4 .10	
Address :									
1. Overall dwelling dime	ensions:								
Basement			a(m²)	(4 =)		ight(m)	7(0-)	Volume(m³	_
	-> (41) - (4 -> - (4 -) - (4 -> (4 -> - (4 -> (4			(1a) x	2	2.6	(2a) =	197.76	(3a)
•	a)+(1b)+(1c)+(1d)+(1e)+(1	n)7	76.06	(4)	\	n (5.)	<i>(</i> 2.)		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:	main seconda	rv	other		total			m³ per hou	r
Number of allians are	heating heating	-					40 – I	-	_
Number of chimneys	0 + 0	_	0] = [0		40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	3	X '	10 =	30	(7a)
Number of passive vents	3				0	Χ,	10 =	0	(7b)
Number of flueless gas f	ires				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a)+(7b)+((7c) =	Г	30		÷ (5) =	0.15	(8)
	peen carried out or is intended, procee			continue fr			. (0) –	0.13	
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber frame or present, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ino great	ior wair arc	a (anoi					
If suspended wooden	floor, enter 0.2 (unsealed) or 0).1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
· ·	s and doors draught stripped		0.05 (0.0	(4.4) 4	1001			0	(14)
Window infiltration			0.25 - [0.2		_	. (1E) _		0	(15)
Infiltration rate	aEO expressed in subject that		(8) + (10)				oroo	0	(16)
•	q50, expressed in cubic metrolity value, then $(18) = [(17) \div 20] +$	•	•	•	elle oi e	rivelope	area	5	(17)
·	es if a pressurisation test has been do				is beina u	sed		0.4	(18)
Number of sides sheltered			, ,	,	3			3	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18) x (20) =				0.31	(21)
Infiltration rate modified	for monthly wind speed								<u> </u>
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m = 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
· L								I	

d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) 25m = 0.58	Adjusted infilt	ration rat	e (allow	ing for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
If mechanical ventilation:	0.4	0.39	0.38	0.34	0.33	0.3	0.3	0.29	0.31	0.33	0.35	0.37		
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (NS)) , otherwise (23b) = (23a) If balanced with hear recovery: efficiency in % allowing for in-user factor (from Table 4h) =			_	rate for t	he appli	cable ca	se	•	•	•		•		
if balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =				a madis Al (O	ah) (00.	-) 		VIC)\) (22-)			0	
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100] Ztajm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0) = (23a)			0	
24a)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				•	_									(230
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) 24b)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1		1		i	- ` ` 	ı ´`	í `	r Ó - Ò		<u>`</u>	÷ 100] I	(246
24bjm= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0												0	l	(248
c) If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) 24d)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1				1	- 	r ´`	í `	r ´ `			l	(0.4)
## 16 (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) ## 24c)m ## 0		ļ	<u> </u>				<u> </u>			0	0	0		(24)
d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) 25m = 0.58	•				•	•				.5 × (23b)			
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] 24d)m = 0.58	(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
24dym	,				•	•				0.5]		,		
3. Heat losses and heat loss parameter: ELEMENT Gross Openings A , m² U-value (W/K) kJ/m²-K kJ/K Doors 2.6			``	· `		· `		- `			0.56	0.57		(240
3. Heat losses and heat loss parameter: ELEMENT Gross Openings A , m² U-value (W/K) kJ/m²-K kJ/K Doors 2.6	Effective air	r change	rate - er	nter (24a	or (24b	o) or (24	c) or (24	d) in bo	x (25)					
Net Area				· ` `	<u> </u>	ŕ	_		``	0.56	0.56	0.57		(25)
Net Area	0 11		-41											
Vindows Type 1	ELEMENT	Gros	SS	Openin	gs						<)			
Vindows Type 2 Vindows Type 3 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 4 Vindows Type 5 Vindows Type 5 Vindows Type 5 Vindows Type 6 Vindows Type 6 Vindows Type 7 Vindows Type 8 Vindows Type 9	Doors					2.6	X	1	=	2.6				(26)
Vindows Type 3 Vindows Type 4 0.52 Vindows Type 4 0.69 0.69 0.70 0.80	Windows Typ	e 1				2.6	x1	/[1/(1.4)+	0.04] =	3.45				(27)
Vindows Type 4 0.52 x1/[1/(1.4) + 0.04] = 0.69 (27)	Windows Typ	e 2				3.15	x1	/[1/(1.4)+	0.04] =	4.18				(27)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 16.41 21.73 x 0.13 = 1.8668 (28) (29) (Windows Typ	e 3				4.39	x1	/[1/(1.4)+	0.04] =	5.82				(27)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 16.41 21.73 x 0.13 = 1.8668 (28) (29) (Windows Typ	e 4				0.52	<u></u>	/[1/(1.4)+	0.04] =	0.69				(27)
Valls Type 1 38.14 16.41 21.73 × 0.18 = 3.91 (29) Valls Type 2 23.92 2.6 21.32 × 0.18 = 3.84 (29) Valls Type 3 5.95 0 5.95 × 0.18 = 1.07 (29) Valls Type 4 29.51 0 29.51 × 0.18 = 5.31 (29) Total area of elements, m² (31) Party wall 12.35 × 0 = 0 (32) Party floor 61.7 (32) For windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 40.35 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 28782.9 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)	Floor						_	0.13	i		=			`
Valls Type2 23.92 2.6 21.32 x 0.18 = 3.84 (29) Valls Type3 5.95 0 5.95 x 0.18 = 1.07 (29) Valls Type4 29.51 0 29.51 x 0.18 = 5.31 (29) Cotal area of elements, m² 111.88 (31) (32) Party wall 12.35 x 0 = 0 (32) Party ceiling 76.06 (32) (32) (32) (32) (32) (33) (34) (34) Party ceiling 76.06 (26)(30) + (32) + (32a) + (29.1	14	16.4	1		=		_		ᆿ ¦		╡┝	
Valls Type3 5.95 0 5.95 x 0.18 = 1.07 (29) Valls Type4 29.51 0 29.51 x 0.18 = 5.31 (29) Total area of elements, m² 111.88 (31) Party wall 12.35 x 0 = 0 (32) Party ceiling 76.06 (32) For windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (29) Heat capacity Cm = S(A x K) ((28)(30) + (32) + (32a)(32e) = 28782.9 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)	• •				'- 		=		=		믁 ¦		╡┝	===
Valls Type4	• •				_		=		=		亅 ¦		╡╞	
Total area of elements, m ² 111.88 Party wall 12.35 Party floor 61.7 Party ceiling for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x K) ((28)(30) + (32) = (32) (32) (32) (32) (32) (33) (34) (35) (128)(30) + (32) + (32a)(32e) = (32) (36) (37) (38) (38) (39) (128)(30) + (32) + (32a)(32e) = (32) (39) (30) (31) (31) (31) (32) (32) (32) (33) (34) (35) (36) (37) (37) (38) (38) (38) (38) (38) (39) (39) (30) (30) (30) (31) (32) (31) (32) (32) (32) (33) (34) (35) (36) (37) (38) (38) (38) (39) (30)	• •				_				_		ᆿ ¦		╡╞	
Party wall 12.35 \times 0 = 0	• •			0		29.51	X	0.18	=	5.31				
Party floor Party ceiling 76.06 (32) For windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) (128)(30) + (32) = 28782.9 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)		elements	, m²			111.8	8							
Party ceiling for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) (26)(30) + (32) = (128)(30) + (32) + (32a)(32e) = (27)	•					12.35	, x	0	=	0			╛╘	(32)
for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 40.35 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 28782.9 (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium 250 (35)	Party floor					61.7								(328
* include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) Heat capacity $Cm = S(A \times K)$ Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m²K $(26)(30) + (32) = (33)$ $((28)(30) + (32) + (32a)(32e) = (34)$ (35) (35)	Party ceiling					76.06	5							(32)
Fabric heat loss, W/K = S (A x U) $ (26)(30) + (32) = $							ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	3.2	
Heat capacity Cm = S(A x k) $ ((28)(30) + (32) + (32a)(32e) = 28782.9 $ (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium 250 (35)					is and par	titions		(26) (30)) + (32) -					
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)			,	U)				(20)(30)		(20) + (20	0) 1 (225)	(220)		
) _ ^-	TEAL:	a						(3∠e) =		====
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f		•	•		,							-bl- 41	250	(35)

can be used instea	ad of a de	tailed calcı	ulation										
Thermal bridge				using Ap	pendix I	K						15.62	(36)
if details of therma	,	•			•							10.02	(0.0)
Total fabric hea	at loss							(33) +	(36) =			55.98	(37)
Ventilation hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)	,		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 37.77	37.57	37.38	36.46	36.28	35.48	35.48	35.34	35.79	36.28	36.63	37		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (3	38)m		_	
(39)m= 93.75	93.55	93.35	92.43	92.26	91.46	91.46	91.31	91.77	92.26	92.61	92.97		
Heat loss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷		12 /12=	92.43	(39)
(40)m= 1.23	1.23	1.23	1.22	1.21	1.2	1.2	1.2	1.21	1.21	1.22	1.22		
Number of day	s in mor	nth (Tabl	le 1a)			-			Average =	Sum(40) ₁	12 /12=	1.22	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
						•						•	
4. Water heat	ing ener	gy requi	irement:								kWh/ye	ear:	
Assumed seem	nanay I	NI.										Ī	(40)
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.38		(42)
Annual averag	,	ater usag	ge in litre	es per da	ıy Vd,av	erage =	(25 x N)	+ 36		90).82		(43)
Reduce the annua not more that 125	_				_	_	to achieve	a water us	se target o	f		ı	
						•	ι.					l	
Jan Hot water usage in	Feb	Mar day for ea	Apr ach month	Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
(44)m= 99.9	90.27	92.03	09	00.37	01.73	01.73	00.37		Total = Su	<u> </u>		1089.8	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1000.0	(```
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
									Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)					
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storage Storage volum		includin	na anv e	alar or M	/\//HRS	etorana	within es	ma vas	امء		0	1	(47)
If community h	` ,		•			_		iiiie ves	361		0		(47)
Otherwise if no	_			_			` '	ers) ente	er '0' in (47)			
Water storage			`					,	`	,			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro		-	-				(48) x (49)	=			0		(50)
b) If manufact			-									I	(54)
Hot water stora If community h	-			€ ∠ (KVVI	ii/iiti C /UZ	ay <i>)</i>					0		(51)
Volume factor	_										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)

Energy lost from w	_	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54)	, ,									0		(55)
Water storage loss	calculated	for each	month	-		((56)m = (55) × (41)r	n	•	,		
(56)m = 0		0	0	0	0	0	0	0	0	0		(56)
If cylinder contains ded	cated solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	(annual) from	om Table	e 3							0		(58)
Primary circuit loss			•	•	` '	, ,						
(modified by fact	1	1	1								l	(50)
(59)m= 0 (0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcula	ed for each	month ((61)m =	(60) ÷ 36	65 × (41))m			_			
(61)m= 50.91 44.	31 47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat required	for water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05 173	88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input calcul	ted using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	contributi	ion to wate	er heating)	•	
(add additional line	s if FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	neater											
(64)m= 199.05 173	88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
	•		•			Outp	out from wa	ater heate	r (annual) ₁	12	1973.65	(64)
		1-14/1- /	11 - 0 - 01	- /	\							
Heat gains from wa	iter neating	, kvvn/m	onth 0.28	5 [0.85	× (45)m	ı + (61)m	า] + 0.8 x	: [(46)m	+ (57)m	+ (59)m]	
Heat gains from wa (65) m= 61.99 $54.$		49.73	48.07	42.17	× (45)m 40.15	+ (61)m 45	1] + 0.8 x 45.5	52.04	+ (57)m 55.8	+ (59)m 60.43]	(65)
	16 56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
(65)m= 61.99 54. include (57)m in	56.26 calculation	49.73 of (65)m	48.07 only if c	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
(65)m= 61.99 54. include (57)m in 5. Internal gains	56.26 calculation	49.73 of (65)m 5 and 5a	48.07 only if c	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (T	56.26 calculation see Table sable 5), Wa	49.73 of (65)m 5 and 5a	48.07 only if c	42.17 ylinder i	40.15 s in the c	45 dwelling	45.5 or hot w	52.04	55.8 om com	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (T	56.26 calculation see Table 5 hable 5), Waleb Mar	49.73 of (65)m 5 and 5a	48.07 only if c	42.17	40.15	45	45.5	52.04 ater is fr	55.8	60.43 munity h		(65)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119	56.26 calculation see Table sable 5), Wareb Mar	49.73 of (65)m 5 and 5a tts Apr 119.19	48.07 only if c): May 119.19	42.17 ylinder is Jun 119.19	40.15 s in the c	45 dwelling Aug 119.19	45.5 or hot w Sep 119.19	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale	56.26 calculation see Table 9 able 5), Wa b Mar 19 119.19 culated in A	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix	48.07 only if c): May 119.19 L, equati	Jun 119.19	40.15 s in the o	45 dwelling Aug 119.19 lso see	45.5 or hot w Sep 119.19 Table 5	52.04 ater is fr Oct 119.19	55.8 om com	60.43 munity h		
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16.	to the second se	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3	48.07 only if c): May 119.19 L, equati 7.7	42.17 ylinder is Jun 119.19 ion L9 of	40.15 s in the c Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see 9.13	45.5 or hot w Sep 119.19 Table 5	52.04 ater is fr Oct 119.19	55.8 om com Nov 119.19	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains (see Table sable 5), Wareb Mar 119.119.119.113.6	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append	May 119.19 L, equati 7.7	Jun 119.19 ion L9 of 6.5 uation L	40.15 s in the c Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see 9.13 3a), also	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal	52.04 ater is fr Oct 119.19 15.56 ble 5	55.8 om com Nov 119.19	60.43 munity h		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213	see Table sable 5), Wareb Marulated in Ara 13.6 calculated in 2 207.68	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93	48.07 only if c): May 119.19 L, equati 7.7 dix L, equali	Jun 119.19 ion L9 of 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1:	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93	55.8 om com Nov 119.19	60.43 munity h		(66)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc	see Table sable 5), Wabb Mar 19 119.19 ulated in A 13.6 calculated in A 207.68 culated in A	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix	48.07 only if c): May 119.19 L, equati 7.7 dix L, equati 181.11 L, equat	Jun 119.19 ion L9 o 6.5 uation L 167.17	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a)	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93	55.8 om com Nov 119.19 18.16	60.43 munity h		(66) (67) (68)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34.	table 5), Wa have been mare to the see Table shall be 5), Wa have been mare to the see Table shall be a see Table	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92	48.07 only if c): May 119.19 L, equati 7.7 dix L, equali	Jun 119.19 ion L9 of 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1:	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93	55.8 om com Nov 119.19	60.43 munity h		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains	to the second se	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a)	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16	Dec 119.19 19.36 201.7		(66) (67) (68) (69)
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include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (cale (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evaporations	see Table sable 5), Wareb Mar 119.119.119.113.6 calculated in A 13.6 calculated in A 2 2 207.68 culated in A 2 34.92 dins (Table 3 3 34.92).115	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93 ppendix 34.92 5a) 3 ttive value	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5)	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95	see Table sable 5), Wareb Mar 119.119.119.113.6 calculated in A 13.6 calculated in A 2 2 207.68 culated in A 3 34.92 sins (Table 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16	Dec 119.19 19.36 201.7		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains	see Table sable 5), Waseb Mar 19 119.19 sulated in A 13.6 calculated in A 20 34.92 sins (Table 3 35 -95.35 s (Table 5)	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92 3	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92 3	55.8 om com Nov 119.19 18.16 187.76 34.92 3	60.43 munity h Dec 119.19 19.36 201.7 34.92 3		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95	see Table sable 5), Waseb Mar 19 119.19 sulated in A 13.6 calculated in A 20 34.92 sins (Table 3 35 -95.35 s (Table 5)	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93 ppendix 34.92 5a) 3 ttive value	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5)	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains	see Table sable 5), Wareb Mar 119.119.119.119.113.6 ralculated in Ar 22.207.68 ration (negation	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	40.15 s in the c Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92 3 -95.35	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92 3 -95.35	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	55.8 om com Nov 119.19 18.16 187.76 34.92 3 -95.35	60.43 munity h Dec 119.19 19.36 201.7 34.92 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale (67)m= 18.83 16. Appliances gains (68)m= 211.01 213 Cooking gains (cale (69)m= 34.92 34. Pumps and fans gains (70)m= 3 3 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains (72)m= 83.31 80.	56.26	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	40.15 s in the c Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92 3 -95.35	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92 3 -95.35	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	55.8 om com Nov 119.19 18.16 187.76 34.92 3 -95.35	60.43 munity h Dec 119.19 19.36 201.7 34.92 3 -95.35		(66) (67) (68) (69) (70)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9	0.77	X	2.6	x	11.28	x	0.63	x	0.7] =	17.93	(75)
Northeast 0.9	0.77	X	3.15	x	11.28	x	0.63	x	0.7	=	21.72	(75)
Northeast 0.9	0.77	X	2.6	х	22.97	x	0.63	x	0.7	=	36.5	(75)
Northeast 0.9	0.77	X	3.15	x	22.97	x	0.63	x	0.7] =	44.22	(75)
Northeast 0.9	0.77	x	2.6	x	41.38	x	0.63	x	0.7] =	65.76	(75)
Northeast 0.9	0.77	X	3.15	х	41.38	x	0.63	x	0.7	=	79.67	(75)
Northeast 0.9	0.77	X	2.6	х	67.96	x	0.63	x	0.7	=	107.99	(75)
Northeast 0.9	0.77	X	3.15	x	67.96	x	0.63	x	0.7	=	130.84	(75)
Northeast 0.9	0.77	X	2.6	х	91.35	x	0.63	x	0.7	=	145.17	(75)
Northeast 0.9	0.77	X	3.15	х	91.35	x	0.63	x	0.7	=	175.87	(75)
Northeast 0.9	0.77	X	2.6	x	97.38	x	0.63	x	0.7	=	154.76	(75)
Northeast 0.9	0.77	X	3.15	x	97.38	x	0.63	x	0.7	=	187.5	(75)
Northeast 0.9	0.77	X	2.6	х	91.1	x	0.63	x	0.7	=	144.78	(75)
Northeast 0.9	0.77	X	3.15	x	91.1	x	0.63	x	0.7	=	175.4	(75)
Northeast 0.9	0.77	x	2.6	x	72.63	x	0.63	x	0.7] =	115.42	(75)
Northeast 0.9	0.77	X	3.15	x	72.63	x	0.63	x	0.7	=	139.83	(75)
Northeast 0.9	0.77	X	2.6	х	50.42	x	0.63	x	0.7	=	80.13	(75)
Northeast 0.9	0.77	x	3.15	x	50.42	x	0.63	x	0.7] =	97.08	(75)
Northeast 0.9	0.77	X	2.6	x	28.07	x	0.63	x	0.7	=	44.6	(75)
Northeast 0.9	0.77	x	3.15	x	28.07	x	0.63	x	0.7] =	54.04	(75)
Northeast 0.9	0.77	x	2.6	x	14.2	x	0.63	x	0.7] =	22.56	(75)
Northeast 0.9	0.77	X	3.15	x	14.2	x	0.63	x	0.7] =	27.33	(75)
Northeast 0.9	0.77	X	2.6	x	9.21	x	0.63	x	0.7	=	14.64	(75)
Northeast 0.9	0.77	x	3.15	x	9.21	x	0.63	x	0.7] =	17.74	(75)
Southwest _{0.9}	0.77	X	4.39	х	36.79		0.63	x	0.7	=	49.36	(79)
Southwest _{0.9}	0.77	X	0.52	x	36.79		0.63	x	0.7	=	5.85	(79)
Southwest _{0.9}	0.77	X	4.39	x	62.67		0.63	X	0.7	=	84.09	(79)
Southwest _{0.9}	0.77	X	0.52	x	62.67		0.63	x	0.7	=	9.96	(79)
Southwest _{0.9}	0.77	x	4.39	x	85.75		0.63	x	0.7	=	115.05	(79)
Southwest _{0.9}	0.77	X	0.52	x	85.75		0.63	x	0.7	=	13.63	(79)
Southwest _{0.9}	0.77	X	4.39	x	106.25		0.63	X	0.7	=	142.55	(79)
Southwest _{0.9}	0.77	X	0.52	x	106.25		0.63	x	0.7	=	16.89	(79)
Southwest _{0.9}	0.77	X	4.39	х	119.01		0.63	x	0.7	=	159.67	(79)
Southwest _{0.9}	0.77	X	0.52	х	119.01		0.63	x	0.7	=	18.91	(79)
Southwest _{0.9}	0.77	X	4.39	x	118.15		0.63	x	0.7] =	158.51	(79)
Southwest _{0.9}	0.77	X	0.52	x	118.15		0.63	x	0.7] =	18.78	(79)
Southwest _{0.9}	0.77	X	4.39	x	113.91		0.63	x	0.7] =	152.83	(79)
Southwest _{0.9}	0.77	X	0.52	x	113.91		0.63	x	0.7] =	18.1	(79)
Southwest _{0.9}	0.77	X	4.39	x	104.39		0.63	x	0.7] =	140.05	(79)

Southwest _{0.9}	0.77	X	0.5	52	x	10	04.39		0.63	x	0.7	=	16.59	(79)
Southwest _{0.9}	0.77	X	4.3	39	x	9	2.85		0.63	x	0.7	=	124.57	(79)
Southwest _{0.9}	0.77	x	0.5	52	x	9	2.85		0.63	x	0.7	=	14.76	(79)
Southwest _{0.9}	0.77	x	4.3	39	x	6	9.27		0.63	x	0.7	=	92.93	(79)
Southwest _{0.9}	0.77	х	0.5	52	x	6	9.27		0.63	x [0.7	=	11.01	(79)
Southwest _{0.9}	0.77	х	4.3	39	x	4	4.07		0.63	х	0.7	=	59.13	(79)
Southwest _{0.9}	0.77	х	0.5	52	x	4	4.07		0.63	x	0.7	=	7	(79)
Southwest _{0.9}	0.77	x	4.3	39	x	3	31.49	Ī	0.63	x	0.7		42.25	(79)
Southwest _{0.9}	0.77	x	0.5	52	x	3	31.49	Ī	0.63	x	0.7		5	(79)
		<u>_</u>						_						
Solar gains i	n watts, c	alculated	for eac	h month				(83)m =	Sum(74)m	(82)m				
(83)m= 94.83	7 174.76	274.1	398.27	499.62	51	19.55	491.11	411.89	316.54	202.58	116.03	79.63		(83)
Total gains -	- internal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts			•			ı	
(84)m= 469.7	8 547.04	632.76	735.33	814.79	81	13.55	771.71	698.94	614.94	522.79	461.2	443.67		(84)
7. Mean int	ernal tem	perature	(heating	season)								·	
Temperatu			`		<i></i>	area f	from Tah	nle 9 T	h1 (°C)				21	(85)
Utilisation f	_				_			JIC 5, 1	111 (0)				21	(00)
	T	Mar		1	Ė		Jul	Λο	Sep	Oct	Nov	Dec	l	
(86)m= 1	0.99	0.99	Apr 0.95	May 0.85	_	Jun).67	0.51	0.58	0.84	0.97	Nov 1	1		(86)
. ,		<u> </u>		l	I		l	<u> </u>		0.57	<u> </u>	'	l	(00)
Mean inter					_						1	l	1	(07)
(87)m= 19.67	7 19.83	20.11	20.49	20.8	20	0.95	20.99	20.98	20.86	20.45	19.99	19.64		(87)
Temperatu	re during h	neating p	eriods ir	rest of	dw	elling	from Ta	able 9,	Th2 (°C)				_	
(88)m= 19.89	19.9	19.9	19.91	19.91	19	9.92	19.92	19.92	19.91	19.91	19.91	19.9		(88)
Utilisation f	actor for o	ains for r	est of d	wellina.	h2.	m (se	ee Table	9a)						
(89)m= 1	0.99	0.98	0.93	0.8).58	0.39	0.45	0.77	0.96	0.99	1		(89)
Mean inter	al tompo	oturo in t	the rest	of dwall	ina	T2 (f	ollow etc	no 2 to	7 in Tob	Io (10)			ı	
(90)m= 18.12	 	18.77	19.31	19.72	Ť	9.89	19.91	19.91	19.8	19.27	18.61	18.09	l	(90)
(00)111= 10.11	10.00	10.77	10.01	10.72	L ''	0.00	10.01	10.01			ng area ÷ (4		0.26	(91)
												-,	0.20	(01)
Mean inter					_		ì	+ (1 –		i	1	ı	1	
(92)m= 18.52		19.12	19.61	19.99		0.16	20.19	20.19		19.57	18.96	18.48		(92)
Apply adjus		1			_		i e	1			ı		1	4
(93)m= 18.52		19.12	19.61	19.99	20	0.16	20.19	20.19	20.07	19.57	18.96	18.48		(93)
8. Space h														
Set Ti to the					ned	at ste	ep 11 of	Table	9b, so tha	nt Ti,m=(76)m an	d re-cald	culate	
the utilisation		<u> </u>		I		l	11	Λ	Can		Novi	Daa	1	
Jar		Mar Mar	Apr	May	<u> </u>	Jun	Jul	Aug	Sep	Oct	Nov	Dec	İ	
Utilisation f	0.99	0.98	0.93	0.8	Γ,	0.6	0.42	0.49	0.78	0.96	0.99	1	1	(94)
Useful gain				<u> </u>	Ц,	0.0	0.42	0.49	1 0.76	0.90	0.38		İ	(07)
(95)m= 467.6		, VV = (9 ² 617.23	680.35	652.63	48	37.63	325.25	339.85	478.24	500.19	457.03	442.12	l	(95)
Monthly av				l .			1 020.20	1 200.00	1 110.27	1 000.10	1 .57.00	1 12.12	l	(55)
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra				<u> </u>	_		<u> </u>				1		l	(= - /
	36 1294.52		990.26	765.01	_	, vv = 08.48	328.26	345.66	`	827.94	1098.27	1327.85		(97)
(0.)	1204.02	1	550.20	1 . 55.61	1		1 525.25	1 5 .5.50	1 0,0	1 521.04	1 . 300.27	1 .027.00	i	\= /

Space heating requireme	ent fo	r each m	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m			
(98)m= 643.72 505.84 4°	16.98	223.14	83.61	0	0	0	0	243.85	461.7	658.99		
						Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3237.83	(98)
Space heating requirement	ent in	kWh/m²	/year								42.57	(99)
9a. Energy requirements	– Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heating:			/							г		7,004
Fraction of space heat fr		-		mentary	-	(202) = 1 -	(201) -			Ļ	0	(201)
Fraction of space heat fr		•	. ,			(202) = 1	,	(203)] =		L	1	(202)
Fraction of total heating		•				(204) = (2	02) 🗶 [1 —	(203)] =		Ļ	1	(204)
Efficiency of main space				a avatan	. 0/					Ļ	93.4	(206)
Efficiency of secondary/s	···				·	Α .	0	0.1	NI.		0	(208)
Jan Feb Space heating requirement	Mar	Apr alculated	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
· - i · -	16.98	223.14	83.61	0	0	0	0	243.85	461.7	658.99		
(211) m = {[(98)m x (204)]]	00 ÷ (20	6)	l	l		l					(211)
	46.45	238.91	89.52	0	0	0	0	261.08	494.32	705.56		
	•					Tota	l (kWh/yea	ar) =Sum(2	211) _{15,101}	<u></u>	3466.63	(211)
Space heating fuel (second			month									
$= \{[(98)m \times (201)]\} \times 100$ (215)m= 0 0	$\frac{0 \div (20)}{0}$	8) 0	0	0	0	0	0	0	0	0		
(215)m= 0 0	0	U	U	0	0	_		ar) =Sum(2			0	(215)
Water heating								, ,	715,101	Ĺ		
Output from water heater	r (calc	ulated al	oove)									
	80.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		_
Efficiency of water heater											80.3	(216)
()	87.09	85.88	83.57	80.3	80.3	80.3	80.3	85.98	87.32	87.88		(217)
Fuel for water heating, kV $(219)m = (64)m \times 100 \div$												
(219)m= 226.73 198.53 20	07.74	186.84	185.9	170.39	163.25	181.98	183.99	195.66	205.66	221.18		_
						Tota	I = Sum(2			L	2327.86	(219)
Annual totals Space heating fuel used,	main	cyctom	1					k\	Wh/yea	, г	kWh/year	,
	mam	System	1							Ļ	3466.63	_
Water heating fuel used										L	2327.86	
Electricity for pumps, fans	s and	electric	keep-ho	t								
central heating pump:										30		(230c)
boiler with a fan-assisted	d flue									45		(230e)
Total electricity for the ab-	ove, k	Wh/yea	r			sum	of (230a).	(230g) =		Ī	75	(231)
Electricity for lighting										Ī	332.6	(232)
12a. CO2 emissions – Ir												

Energy

kWh/year

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Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216 =	748.79 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	502.82 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1251.61 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	172.62 (268)
Total CO2, kg/year	sum	of (265)(271) =	1463.15 (272)

 $TER = 19.24 \tag{273}$

		User De	etails:						
Assessor Name:	Chris Hocknell		Strom	a Num	her:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
		Property A	Address	Flat 2-1	I-Lean				
Address :									
1. Overall dwelling dime	ensions:								
Basement		Area	` 	(10) **		ight(m)	(2a) =	Volume(m³	_
	\			(1a) x		2.6	(2a) =	192.56	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 72	4.06	(4)					_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:	main accorde		-4b		40401			m3 man hav	
	main seconda heating heating	iry •	other		total		i	m³ per hou	r
Number of chimneys	0 + 0	+	0	_ = _	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				3	x ′	10 =	30	(7a)
Number of passive vents	3			Ē	0	x '	10 =	0	(7b)
Number of flueless gas f	ires			Ē	0	X 4	40 =	0	(7c)
				_					_
							Air ch	anges per ho	ur
	ys, flues and fans = $(6a)+(6b)+$				30		÷ (5) =	0.16	(8)
If a pressurisation test has be Number of storeys in the	peen carried out or is intended, proce	ed to (17), o	therwise o	continue fr	om (9) to ((16)			(9)
Additional infiltration	ne aweiling (113)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for	masonr	y constr	uction	,	•	0	(11)
	resent, use the value corresponding	to the greate	er wall are	a (after			!		
deducting areas of openia	<i>ngs); if equal user 0.35</i> floor, enter 0.2 (unsealed) or () 1 (seale	d) else	enter 0				0	(12)
If no draught lobby, en	,	7.1 (Scale)	u), 0100	Cittor o				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration		(0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate		((8) + (10)	+ (11) + (1	2) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	ur per s	quare m	etre of e	envelope	area	5	(17)
·	lity value, then $(18) = [(17) \div 20] +$							0.41	(18)
	es if a pressurisation test has been do	one or a deg	ree air pe	rmeability	is being u	sed	ı		٦
Number of sides sheltere Shelter factor	ea	((20) = 1 -	0.075 x (1	9)] =			2 0.85	(19)
Infiltration rate incorpora	ting shelter factor		(21) = (18)		/-			0.34	(21)
Infiltration rate modified f	•		, , , ,					0.54	()
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7	•				•	•		
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Footon (00-) (0	2) 4	· ·				-		•	
Wind Factor $(22a)m = (2(22a)m = 1.27)$ 1.25	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
(ΣΣα)Π- 1.21 1.20	1.20 1.1 1.00 0.95	0.95	0.32	'	1.00	1.12	1.10		

0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.34	0.37	0.39	0.41]	
alculate effe		-	rate for t	he appli	cable ca	se	!	!				J	
If mechanica				al.) (aa				. (22)	\ (22.\			0	(2
If exhaust air h									o) = (23a)			0	(2
If balanced with		-	-	_								0	(2
a) If balance					i	- 	, 	ŕ	 		1 ` '	i ÷ 100] I	(2)
4a)m= 0	0	0	0	0	0	0	0	0	0	0	0	J	(2
b) If balance							- ^ ` ` - 	i `	 		Ι.	1	10
4b)m= 0	0	0	0	0		0	0	0	0	0	0	J	(2
c) If whole h	ouse exti			•	•				.5 × (23b)	_		
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)n	ventilatio n = 1, the				•				0.5]			_	
4d)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58]	(2
Effective air	change r	ate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	•			•	
5)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58]	(2
. Heat losse	s and hea	at loss p	paramete	er:									
LEMENT	Gross area (Openin m		Net Ar A ,r		U-val W/m2		A X U (W/ł	<)	k-value kJ/m²-		A X k kJ/K
oors					2.6	X	1	=	2.6				(2
indows Type	1				2.52	x1	/[1/(1.4)+	0.04] =	3.34				(2
indows Type	2				3.05	_X 1	/[1/(1.4)+	0.04] =	4.04				(2
indows Type	3				4.26	x1	/[1/(1.4)+	0.04] =	5.65				(2
indows Type	4				0.5	x1	/[1/(1.4)+	0.04] =	0.66				(2
alls Type1	67.78	3	15.9		51.88	3 x	0.18	=	9.34				(2
alls Type2	24.47	7	2.6		21.87	7 X	0.18	<u> </u>	3.94	T i			(2
alls Type3	5.93		0		5.93	x	0.18		1.07	F i		7 F	(2
otal area of e	lements,	m²			98.18	3							(3
arty wall					12.38	3 x	0		0	— [(3
arty floor					74.06	=			<u>_</u>	ا نــــ ا		╡⊢	(
arty ceiling					74.06	=				l [(
or windows and	roof windo	ws, use e	effective wi	ndow U-va			g formula 1	/[(1/U-valu	ue)+0.041 a	l s given in	n paragraph		(
include the area							,		, , , , ,	3	7 * * * * * * * * * * * * * * * * * * *		
abric heat los	ss, W/K =	S (A x	U)				(26)(30)) + (32) =				38.02	(3
	Cm = S(A)	Axk)						((28).	(30) + (32	2) + (32a)	(32e) =	28717.	.6 (3
eat capacity		er (TMF	c = Cm ÷	- TFA) ir	n kJ/m²K			Indica	ative Value:	Medium		250	(3
eat capacity nermal mass	paramet												
	sments whe			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f		

Total fabric hea	at loop							(22)	(26) -		1		7(07)
Ventilation hea		alculatos	l monthly	.,					(36) =	25)m x (5)		46.44	(37)
			· ·	í	lup	11	Δυα				Dec		
(38)m= 37.92	Feb 37.68	Mar 37.44	Apr 36.35	May 36.14	Jun 35.18	Jul 35.18	Aug 35.01	Sep 35.55	Oct 36.14	Nov 36.56	36.99		(38)
Heat transfer c			00.00		000		00.01		= (37) + (37)		00.00		, ,
(39)m= 84.36	84.12	83.88	82.78	82.58	81.62	81.62	81.44	81.99	82.58	82.99	83.43		
` /			<u> </u>	<u> </u>		<u> </u>	<u> </u>		L Average =	Sum(39) _{1.}	12 /12=	82.78	(39)
Heat loss para	meter (H	HLP), W	m²K					(40)m	= (39)m ÷	(4)			
(40)m= 1.14	1.14	1.13	1.12	1.12	1.1	1.1	1.1	1.11	1.12	1.12	1.13		_
Number of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.12	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
			•				•			•		!	
4. Water heat	ing ener	gy requi	irement:								kWh/ye	ear:	
												ı	
Assumed occu if TFA > 13.9			[1 - exp	(<u>-</u> 0 0003	449 v (TF	-Δ -13 Q	1211 + 0 (0013 x (Γ F Δ -13		34		(42)
if TFA £ 13.9		11.70 X	ι σχρ	(0.0000	л X (11	7. 10.5	<i>)</i> 2)] 1 0.0) X 010 X (1177 10.	J			
Annual average			•	•	•	_	` ,				.79		(43)
Reduce the annua not more that 125	-		• .		-	-	to achieve	a water us	se target o	f			
		,				<u> </u>	Δ	0	0-4	Nan	Date		
Jan Hot water usage in	Feb	Mar day for ea	Apr ach month	May Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
(44)111= 90.77	90.17	91.50	07.99	04.4	00.01	00.01	04.4			m(44) ₁₁₂ =		1077.45	(44)
Energy content of	hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			. ,		1077.40	
(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
If instantaneous w	ater heatir	na at point	of use (no	o hot water	· storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
(46)m= 21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water storage		10.00	17.20	10.00	14.01	10.20	10.22	10.4	17.00	10.00	21.20		(12)
Storage volume	e (litres)	includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	eating a	nd no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise if no		hot wate	er (this in	rcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage			(:	/1.\^//	- /-l · · ·						ı	
a) If manufacti				or is kno	wn (kvvr	n/day):					0		(48)
Temperature fa							(10)				0		(49)
Energy lost from b) If manufactor		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stora			-								0		(51)
If community h	•			•		•							, ,
Volume factor											0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost from		_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) in (5	55)									0		(55)

water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	55 × (41)	m				•	
(modified by	/ factor fi	rom Tab	le H5 if t	here is s	solar wat	ter heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat req	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	v) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	l lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (€)				_	
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
					•	•	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include (57)	m in cald	culation of	of (65)m	only if c	vlindor i	·						•	
			31 (00)111	Offiny II C	yımden i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see		. ,	•	ylinder is	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
	·	e Table 5	and 5a	•	gillider is	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gair Metabolic gair Jan	·	e Table 5	and 5a	•	Jun	Jul	Aug	or hot w	ater is fr	Nov	munity h	eating	
Metabolic gair	ns (Table	Table 5	and 5a):					•			eating	(66)
Metabolic gair	rs (Table Feb	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	May	Jun 117.03	Jul 117.03	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
Metabolic gair Jan (66)m= 117.03	rs (Table Feb	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	May	Jun 117.03	Jul 117.03	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
Metabolic gair Jan (66)m= 117.03 Lighting gains	Feb 117.03 (calcula	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a 6.88	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov 117.03	Dec 117.03	eating	, ,
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44	Feb 117.03 (calcula	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a 6.88	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov 117.03	Dec 117.03	eating	, ,
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga	reb 117.03 (calcula 16.38 lins (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equat 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(67)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58	reb 117.03 (calcula 16.38 lins (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equat 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(67)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	reb (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 c (calcula 34.7	Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31 5	Nov 117.03 17.78	Dec 117.03 18.95	eating	(67) (68)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains	reb (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 c (calcula 34.7	Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31 5	Nov 117.03 17.78	Dec 117.03 18.95	neating	(67) (68)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3	res (Table Feb 117.03 (calcula 16.38 Lins (calcula 208.73 (calcula 34.7 Lins gains 3	203.32 ulated in Ap 204.7 (Table 5	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	res (Table Feb 117.03 (calcula 16.38 Lins (calcula 208.73 (calcula 34.7 Lins gains 3	203.32 ulated in Ap 204.7 (Table 5	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62	reb (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 c (calcula 34.7 ns gains 3 raporatio -93.62	ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69) (70)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev	reb (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 c (calcula 34.7 ns gains 3 raporatio -93.62	ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	neating	(67) (68) (69) (70)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62 Water heating (72)m= 82.37	res (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 s (calcula 34.7 ns gains 79.62 gains (T	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negation of the companion of t	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7 3	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7 3	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3 -93.62	Dec 117.03 18.95 197.47 34.7 3 -93.62 80.3	eating	(67) (68) (69) (70) (71)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62 Water heating	res (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 s (calcula 34.7 ns gains 79.62 gains (T	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negation of the companion of t	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7 3	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7 3	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3 -93.62	Dec 117.03 18.95 197.47 34.7 3 -93.62 80.3	neating	(67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.52	x	11.28	x	0.63	x	0.7] =	17.38	(75)
Northeast _{0.9x} 0.77	x	3.05	x	11.28	X	0.63	х	0.7	=	21.03	(75)
Northeast 0.9x 0.77	x	2.52	x	22.97	x	0.63	х	0.7	=	35.38	(75)
Northeast 0.9x 0.77	x	3.05	x	22.97	x	0.63	x	0.7] =	42.82	(75)
Northeast 0.9x 0.77	x	2.52	x	41.38	x	0.63	х	0.7	=	63.74	(75)
Northeast 0.9x 0.77	x	3.05	x	41.38	x	0.63	х	0.7	=	77.14	(75)
Northeast _{0.9x} 0.77	x	2.52	x	67.96	X	0.63	х	0.7	=	104.67	(75)
Northeast _{0.9x} 0.77	x	3.05	x	67.96	x	0.63	x	0.7	=	126.69	(75)
Northeast _{0.9x} 0.77	x	2.52	x	91.35	x	0.63	х	0.7	=	140.7	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.35	x	0.63	x	0.7	=	170.29	(75)
Northeast _{0.9x} 0.77	x	2.52	x	97.38	x	0.63	x	0.7	=	150	(75)
Northeast _{0.9x} 0.77	x	3.05	x	97.38	x	0.63	x	0.7	=	181.55	(75)
Northeast _{0.9x} 0.77	x	2.52	x	91.1	x	0.63	x	0.7	=	140.32	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.1	x	0.63	x	0.7	=	169.83	(75)
Northeast _{0.9x} 0.77	x	2.52	x	72.63	x	0.63	x	0.7	=	111.87	(75)
Northeast _{0.9x} 0.77	x	3.05	x	72.63	x	0.63	x	0.7	=	135.39	(75)
Northeast _{0.9x} 0.77	x	2.52	x	50.42	x	0.63	x	0.7	=	77.66	(75)
Northeast _{0.9x} 0.77	x	3.05	x	50.42	x	0.63	x	0.7	=	94	(75)
Northeast _{0.9x} 0.77	x	2.52	x	28.07	x	0.63	x	0.7	=	43.23	(75)
Northeast _{0.9x} 0.77	X	3.05	x	28.07	X	0.63	х	0.7	=	52.32	(75)
Northeast _{0.9x} 0.77	x	2.52	x	14.2	x	0.63	х	0.7	=	21.87	(75)
Northeast _{0.9x} 0.77	X	3.05	x	14.2	X	0.63	х	0.7	=	26.47	(75)
Northeast _{0.9x} 0.77	x	2.52	x	9.21	x	0.63	x	0.7	=	14.19	(75)
Northeast _{0.9x} 0.77	x	3.05	x	9.21	x	0.63	x	0.7	=	17.18	(75)
Southwest _{0.9x} 0.77	x	4.26	x	36.79		0.63	X	0.7	=	47.9	(79)
Southwest _{0.9x} 0.77	x	0.5	x	36.79]	0.63	X	0.7	=	5.62	(79)
Southwest _{0.9x} 0.77	x	4.26	x	62.67		0.63	X	0.7	=	81.6	(79)
Southwest _{0.9x} 0.77	X	0.5	X	62.67		0.63	x	0.7	=	9.58	(79)
Southwest _{0.9x} 0.77	X	4.26	x	85.75]	0.63	X	0.7	=	111.64	(79)
Southwest _{0.9x} 0.77	X	0.5	X	85.75		0.63	X	0.7	=	13.1	(79)
Southwest _{0.9x} 0.77	X	4.26	X	106.25		0.63	X	0.7	=	138.33	(79)
Southwest _{0.9x} 0.77	X	0.5	x	106.25		0.63	x	0.7	=	16.24	(79)
Southwest _{0.9x} 0.77	x	4.26	x	119.01		0.63	X	0.7	=	154.94	(79)
Southwest _{0.9x} 0.77	x	0.5	x	119.01		0.63	X	0.7	=	18.19	(79)
Southwest _{0.9x} 0.77	x	4.26	x	118.15]	0.63	x	0.7	=	153.82	(79)
Southwest _{0.9x} 0.77	x	0.5	x	118.15]	0.63	x	0.7	=	18.05	(79)
Southwest _{0.9x} 0.77	x	4.26	x	113.91]	0.63	x	0.7	=	148.3	(79)
Southwest _{0.9x} 0.77	x	0.5	x	113.91]	0.63	x	0.7	=	17.41	(79)
Southwest _{0.9x} 0.77	X	4.26	x	104.39]	0.63	X	0.7	=	135.91	(79)

Southw	est _{0.9x}	0.77	X	0.	5	X	10	04.39]		0.63	x	0.7	=	15.95	(79)
Southw	est _{0.9x}	0.77	X	4.2	26	x	9	2.85]		0.63	x	0.7	=	120.88	(79)
Southw	est _{0.9x}	0.77	X	0.	5	x	9	2.85			0.63	x	0.7	=	14.19	(79)
Southw	est _{0.9x}	0.77	X	4.2	26	x	6	9.27]		0.63	x	0.7	=	90.18	(79)
Southw	est _{0.9x}	0.77	X	0.	5	x	6	9.27]		0.63	x [0.7	=	10.58	(79)
Southw	est _{0.9x}	0.77	X	4.2	26	X	4	4.07] [0.63	x	0.7	=	57.38	(79)
Southw	est _{0.9x}	0.77	X	0.	5	x	4	4.07			0.63	x	0.7	=	6.73	(79)
Southw	est _{0.9x}	0.77	x	4.2	26	x	3	1.49	Ì		0.63	x	0.7	_ =	40.99	(79)
Southw	est _{0.9x}	0.77	x	0.	5	x	3	1.49]		0.63	x	0.7		4.81	(79)
	_															
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m=	91.94	169.36	265.62	385.92	484.12	50	03.42	475.86	399.	.12	306.73	196.32	112.44	77.18		(83)
Total g	ains – i	nternal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts	•	•			•	•		
(84)m=	460.44	535.26	618.13	717.23	793.94	79	92.46	751.75	681.	.37	600.13	511.13	451.77	435.01		(84)
7. Me	an inter	nal tem	perature	(heating	season)							-			
			neating p	`		<i>'</i>	area f	from Tal	ole 9	Th′	1 (°C)				21	(85)
•		ŭ	ains for			•			,		. (•)					(22)
	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.98	0.94	0.82	\vdash	0.63	0.47	0.5	- 	0.81	0.97	1	1	=	(86)
Moon	intorno	l tompor	oturo in	living or	00 T1 /f/	حالم	w oto	no 2 to 7	7 in T	- L	. 00)		I .	l	_	
(87)m=	19.79	19.95	ature in	20.58	20.85	_	w Ste	20.99	20.9	_	20.9	20.54	20.1	19.77	٦	(87)
					<u> </u>			<u> </u>	l			20.04	20.1	10.77		(0.)
			neating p	1	1	dw		l		\neg	<u> </u>		ı		7	(2.2)
(88)m=	19.97	19.97	19.97	19.99	19.99		20	20	20)	20	19.99	19.98	19.98		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,	m (se	e Table	9a)						_	
(89)m=	1	0.99	0.98	0.92	0.77	C).54	0.37	0.4	3	0.74	0.96	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ina	T2 (fc	ollow ste	eps 3	to 7	' in Tabl	e 9c)				
(90)m=	18.36	18.6	19	19.51	19.85	Ť	9.98	20	20	$\overline{}$	19.92	19.45	18.83	18.33		(90)
1											f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Maan	intorno	l tompor	oturo (fo	r tha wh	مینام ماییم	ر مناا	~\ fl	. A T1	. /4	£I	Λ) Το					
(92)m=	18.74	18.96	ature (fo	19.79	20.11	_	g) = 11 0.24	20.26	20.2		A) × 12	19.74	19.16	18.71	٦	(92)
			L 19.32 he mear	<u> </u>				<u> </u>					19.10	10.71		(32)
(93)m=	18.74	18.96	19.32	19.79	20.11	_	0.24	20.26	20.2		20.18	19.74	19.16	18.71		(93)
			uirement		20.11		0.2 1	20.20			20.10	10.71	10.10	10.71		(5-5)
•					re ohtair	ned	at sta	en 11 of	Tabl	e Gh	so tha	t Ti m-	(76)m an	d re-ca	lculate	
			or gains	•		ica	at ott	SP 11 01	Tabl	0 00	, 50 tha	,	(70)111 a11	a 10 0a	iodiate	
	Jan	Feb	Mar	Apr	May	Ι,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	<u>. </u>					•	<u> </u>					_	
(94)m=	1	0.99	0.97	0.92	0.78	().57	0.4	0.4	6	0.75	0.95	0.99	1		(94)
Usefu	l gains,	hmGm	, W = (94	4)m x (8	4)m				•	•			•		_	
(95)m=	458.36	529.97	601.85	657.25	616.88	44	48.58	297.17	311.	.16	450.96	486.75	447.56	433.51		(95)
Month	nly aver	age exte	ernal tem	perature	from Ta	able	e 8								_	
(96)m=	4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat I	loss rate	for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(93	3)m-	- (96)m]			_ _	
(97)m=	1217.98	1182.32	1075.23	901.41	694.85	46	60.44	298.65	314.	.19	498.1	754.59	1000.92	1210.52	2	(97)
•																

Space heating require	r		1	Wh/mont	th = 0.02	24 x [(97))m – (95	ŕ	r -			
(98)m= 565.16 438.38	352.19	175.8	58.01	0	0	0	0	199.28	398.42	578.09		–
						Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2765.33	(98)
Space heating require	ment in	kWh/m²	² /year							L	37.34	(99)
9a. Energy requiremen	ts – Indi	vidual h	eating s	ystems i	ncluding	g micro-C	CHP)					
Space heating: Fraction of space hea	t from se	econdar	v/supple	mentarv	svstem						0	(201)
Fraction of space hea				,	-,	(202) = 1 -	- (201) =				1	(202)
Fraction of total heating		-	` '			(204) = (2	02) x [1 –	(203)] =		-	1	(204)
Efficiency of main spa										-	93.4	(206)
Efficiency of secondar				g system	າ, %						0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ ear
Space heating require	ment (c	•			l			l .	!	<u></u>	,	
565.16 438.38	352.19	175.8	58.01	0	0	0	0	199.28	398.42	578.09		
(211)m = {[(98)m x (20	4)] } x 1	00 ÷ (20)6)									(211)
605.09 469.36	377.08	188.22	62.11	0	0	0	0	213.36	426.57	618.94		_
						Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	<i>=</i>	2960.74	(211)
Space heating fuel (se	-		month									
$= \{[(98)m \times (201)] \} \times 10^{-1}$ $(215)m = 0 \qquad 0$	00 ÷ (20)	8)	0	0	0	0	0	0	0	0		
(213)111- 0 0		0			0			_	215) _{15.1012}	_	0	(215)
Water heating							,		7 10,1012	L		` ′
Output from water heat	er (calcı	ulated a	bove)									
196.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
Efficiency of water hea	ter		•		•						80.3	(216)
(217)m= 87.56 87.31	86.73	85.31	82.84	80.3	80.3	80.3	80.3	85.51	87.03	87.65		(217)
Fuel for water heating, $(219)m = (64)m \times 100$												
(219)m= 224.77 196.9	206.23	185.96	185.41	168.46	161.4	179.92	181.91	194.52	204.03	219.26		
-						Tota	I = Sum(2	19a) ₁₁₂ =		•	2308.77	(219)
Annual totals								k\	Wh/year		kWh/yea	
Space heating fuel use	d, main	system	1							L	2960.74	
Water heating fuel use	d										2308.77	
Electricity for pumps, fa	ans and	electric	keep-ho	t								
central heating pump:										30		(230
boiler with a fan-assis	ted flue									45		(230
Total electricity for the	above, k	:\Wh/vea	r			sum	of (230a).	(230g) =			75	(231)
Total cicculotty for the	, .	CVVIII y O O										
Electricity for lighting		(VVIII) y 00								L T	325.7	

Energy

kWh/year

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Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216 =	639.52 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	498.69 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1138.21 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	169.04 (268)
Total CO2, kg/year	sum o	of (265)(271) =	1346.18 (272)

TER =

(273)

18.18

		User Deta	ails:				
Assessor Name:	Chris Hocknell		roma Nun	nber:	STRC	016363	
Software Name:	Stroma FSAP 2012		oftware Ve			on: 1.0.4.10	
	F	Property Add	dress: Flat 2-	-2-Lean			
Address :							
1. Overall dwelling dime	ensions:						
Danamant		Area(m			ight(m)	Volume(m ³	<u> </u>
Basement		76.06	6 (1a) x	2	2.6 (2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 76.06	6 (4)				
Dwelling volume			(3a)+(3	b)+(3c)+(3c	d)+(3e)+(3n) =	197.76	(5)
2. Ventilation rate:							
	main seconda heating heating	ry oth	her	total		m³ per hou	ır
Number of chimneys	0 + 0	+	0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+	0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ins			3	x 10 =	30	(7a)
Number of passive vents	3		[0	x 10 =	0	(7b)
Number of flueless gas fi	ires		[0	x 40 =	0	(7c)
_			L				`
					Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)$	7a)+(7b)+(7c) :	=	30	÷ (5) =	0.15	(8)
	peen carried out or is intended, procee	ed to (17), othe	erwise continue	from (9) to	(16)	,	
Number of storeys in the Additional infiltration	he dwelling (ns)				[(0) 4] 0 4	0	(9)
	.25 for steel or timber frame o	r 0 35 for m	aconty conc	truction	[(9)-1]x0.1 =	0	(10)
	resent, use the value corresponding t		•	iruction		0	(11)
deducting areas of openii	= : :						_
•	floor, enter 0.2 (unsealed) or 0).1 (sealed),	, else enter 0)		0	(12)
If no draught lobby, en						0	(13)
Window infiltration	s and doors draught stripped	0.24	5 - [0.2 x (14) ÷	1001 -		0	(14)
Infiltration rate			+ (10) + (11) + ·		+ (15) =	0	(15)
	q50, expressed in cubic metro					0	(16)
•	lity value, then $(18) = [(17) \div 20] +$	-			invelope area	0.4	(18)
· ·	es if a pressurisation test has been do			y is being u	sed	0.4	(,
Number of sides sheltered	ed					3	(19)
Shelter factor		(20)) = 1 - [0.075 x	(19)] =		0.78	(20)
Infiltration rate incorporate	ting shelter factor	(21)) = (18) x (20) =	:		0.31	(21)
Infiltration rate modified f	for monthly wind speed					1	
Jan Feb	Mar Apr May Jun	Jul	Aug Sep	Oct	Nov Dec		
Monthly average wind sp	peed from Table 7					-	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7 4	4.3	4.5 4.7		
Wind Factor (22a)m = (2	2)m ÷ 4						
	1.23 1.1 1.08 0.95	0.95	0.92 1	1.08	1.12 1.18]	
. ,					<u> </u>	1	

0.4	ation rate	0.38	0.34	0.33	0.3	0.3	0.29	0.31	0.33	0.35	0.37	1		
Calculate effec						l	0.29	0.51	0.55	0.33	0.37	J		
If mechanica	al ventilat	ion:											0	(2:
If exhaust air he	eat pump u	sing Appe	endix N, (2	(3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)				0	(2
If balanced with	heat recov	very: effic	iency in %	allowing t	or in-use f	actor (fron	n Table 4h) =					0	(2
a) If balance	d mecha	nical ve	ntilation	with he	at recov	ery (MV	HR) (24a	a)m = (2)	2b)m + (2	23b) × [1 – (23c) ÷ 100]		
24a)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
b) If balance			ntilation	i		covery (l	MV) (24b	ŕ	r `			7		
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
c) If whole he if (22b)m	ouse extended $< 0.5 \times$			•	•				.5 × (23b)				
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
d) If natural					•						!	J		
	n = 1, the	<u> </u>	<u> </u>		·							7		
4d)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57			(2
Effective air	 		`	í `	í `	r``	' 	``			1	7		
5)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57			(2
. Heat losse	s and he	at loss p	paramet	er:										
LEMENT	Gros	s	Openin	as	Net Ar	ea	U-val	ue	A X U		k-valu	e	Α >	Χk
	area (_	m					2K	(W/ł	<)				
	area (_			A ,r		W/m2	2K =	(W/ł	<) 	kJ/m²•		kJ/	′K
oors		_			A ,r	m² x	W/m2	=	` `	<) 				
oors indows Type	: 1	_			A ,r	m ² x x 1	W/m2	= 0.04] =	2.6	<) 				′Κ (: (:
oors indows Type indows Type	e 1 e 2	_			A ,r 2.6	m ² x x ¹ x ¹	W/m2 1 /[1/(1.4)+	= (0.04] = (0.04] =	2.6	() 				/Κ (: (:
oors indows Type indows Type indows Type	: 1 : 2 : 3	_			A ,r 2.6 2.6 3.15 4.39	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] =	2.6 3.45 4.18 5.82	<) 				/Κ (; (; (;
oors indows Type indows Type indows Type indows Type	2 2 3 4	(m²)	m	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] = 0.04] =	2.6 3.45 4.18 5.82 0.69	<)				/Κ (2 (2 (3
oors indows Type indows Type indows Type indows Type alls Type1	2 2 3 4 38.14	(m²)	16.4	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91	\$) 				′Κ (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 3 4 4 38.14 23.92	(m²)	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91 3.84	<)				/K (1/K (1/K (1/K (1/K (1/K (1/K (1/K (1
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	23.92 5.95	4 2	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18	= 0.04] = 0.04	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07	<>				/K (1/K (1/K (1/K (1/K (1/K (1/K (1/K (1
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	38.1 ⁴ 23.92 5.95 29.5 ⁴	4 2 1	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91 3.84	<>				/K (X (X (X (X (X (X (X (X (X (X (X (X (X
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e	38.1 ⁴ 23.92 5.95 29.5 ⁴	4 2 1	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31	\$\				/K (; (; (; (; (; (; (; (; (; (; (; (; (;
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e	38.1 ⁴ 23.92 5.95 29.5 ⁴	4 2 1	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 97.52	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18	= 0.04] = 0.04	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07					/K ((((((((((((((((((((((((((((((((((((
indows Type indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor	38.1 ⁴ 23.92 5.95 29.5 ⁴	4 2 1	16.4 2.6	<u>,</u>	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 97.52 12.38	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31	\$\				/K ((((((((((((((((((((((((((((((((((((
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling	23.92 38.14 23.92 5.95 29.57	(m²) 4 2 1 m²	16.4 2.6 0	1	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 12.35 76.06 76.06 alue calcul	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31		kJ/m²-	к 		/K ((((((((((((((((((((((((((((((((((((
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area	23.92 23.92 23.92 5.95 29.57 29.57	(m²) 4 2 1 m² wws, use esides of in	16.4 2.6 0 0	1	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 12.35 76.06 76.06 alue calcul	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18 0 g formula 1	= 0.04] = 0.04	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31		kJ/m²-	K	kJ/	//K (2) (3) (4) (4) (5) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7
indows Type indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	23.92 38.14 23.92 5.95 29.54 29.54 29.55 29.55 29.55 29.55 29.55 29.55 29.55 29.55 29.55	(m²) 4 2 1 m² wws, use esides of interest S (A x	16.4 2.6 0 0	1	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 12.35 76.06 76.06 alue calcul	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	= 0.04] = 0.04	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31	s given in	kJ/m²-	h 3.2	kJ/	//K (2) (2) (2) (2) (3) (4) (4) (5) (5) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7
coors findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area fabric heat los feat capacity for farmal mass	23.92 5.95 29.57 29.	(m²) 4 2 1 m² ws, use e sides of in a s	16.4 2.6 0 0	indow U-vils and par	A ,r 2.6 2.6 3.15 4.39 0.52 21.73 21.32 5.95 29.51 97.52 12.35 76.06 76.06 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18 0 g formula 1	= 0.04] = 0.04	2.6 3.45 4.18 5.82 0.69 3.91 3.84 1.07 5.31	s given in	kJ/m²-	h 3.2	kJ/	//K (2) (3) (4) (4) (5) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7

antila	abric hea		alaulata d	monthl					(33) +	` '	25\m v (5)	L	46.87	(37
entila			alculated						` '		25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0)
8)m=	37.77	37.57	37.38	36.46	36.28	35.48	35.48	35.34	35.79	36.28	36.63	37		(38
eat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m=	84.64	84.44	84.24	83.33	83.15	82.35	82.35	82.2	82.66	83.15	83.5	83.86		_
1 1 .			II D\ \\							_	Sum(39) ₁	12 /12=	83.32	(3
			ILP), W/		1.00	1.00	1.00	1.00	· ,	= (39)m ÷	· /			
0)m=	1.11	1.11	1.11	1.1	1.09	1.08	1.08	1.08	1.09	1.09	1.1	1.1	4.4	(4
umbe	er of dav	s in mor	nth (Tab	e 1a)					,	Average =	Sum(40) ₁	12 / 1 Z=	1.1	(4
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
,	-	-	-		-									•
4 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \												1.20/1./		
ł. VV <i>E</i>	iter neat	ing ener	gy requi	rement:								kWh/ye	ar:	
		pancy, I										38		(4
			+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	9)			
	A £ 13.9	•	tor upon	ıa in litra	o nor de	w.Vd ov	orogo	(25 v NI)	. 26					,
								(25 x N) to achieve		e target o		.82		(4
t more	e that 125	litres per p	person per	day (all w	ater use, l	hot and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot wate	er usage in	n litres per	day for ea	ch month	Vd,m = fa	ctor from	Table 1c x	(43)						
4)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
							•			Γotal = Su	m(44) ₁₁₂ =	-	1089.8	(4
nergy (content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600	kWh/mon	th (see Ta	ables 1b, 1	c, 1d)		
5)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
- ,						-	-			Γotal = Su	m (4E)	1	4.400.0	按 .
										i Olai = Su	III(45) ₁₁₂ =		1428.9	(2
	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,		iotai = Su	III(45) ₁₁₂ =	- L	1428.9	(2
instant	22.22	19.44	ng at point 20.06	of use (no	hot water 16.78	storage), 14.48	enter 0 in 13.42	boxes (46) 15.39		18.16	19.82	21.52	1428.9	
instant 6)m= 'ater	22.22 storage	19.44 loss:	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52	1428.9	(4
instant 6)m= ater corag	22.22 storage e volum	19.44 loss: e (litres)	20.06	17.48 g any so	16.78 Dlar or W	14.48 /WHRS	13.42 storage	15.39 within sa	15.58	18.16	19.82		1428.9	(4
instant 6)m= /ater torag	22.22 storage e volum munity h	19.44 loss: e (litres) eating a	20.06 includin	17.48 g any so	16.78 Dlar or W	14.48 /WHRS nter 110	13.42 storage	15.39 within sa (47)	15.58 nme vess	18.16 sel	19.82	21.52	1428.9	(4
instant 6)m= /ater torag comi	22.22 storage e volum munity h	19.44 loss: e (litres) eating a	20.06 includin	17.48 g any so	16.78 Dlar or W	14.48 /WHRS nter 110	13.42 storage	15.39 within sa	15.58 nme vess	18.16 sel	19.82	21.52	1428.9	(4
instant 6)m= /ater torag comi therv /ater	22.22 storage e volum munity h vise if no storage	19.44 loss: e (litres) eating a o stored loss:	20.06 includin nd no ta hot wate	17.48 g any so nk in dw	16.78 blar or W relling, e	14.48 /WHRS nter 110	storage) litres in	15.39 within sa (47)	15.58 nme vess	18.16 sel	19.82	21.52	1428.9	(4
instant 6)m= later completory therw later) If m	storage e volum munity h vise if no storage	19.44 loss: e (litres) eating a stored loss: urer's de	20.06 including nd no tathet water	g any sonk in dwar (this in	16.78 blar or W relling, e	14.48 /WHRS nter 110	storage) litres in	15.39 within sa (47)	15.58 nme vess	18.16 sel	19.82	21.52	1428.9	(4
instant 6)m= /ater torag comitherv /ater) If mempe	22.22 storage e volum munity h vise if no storage anufact erature fa	19.44 loss: e (litres) eating a stored loss: urer's de	20.06 including nd no tathot water eclared logical metals.	g any sonk in dw r (this incoss factor 2b	16.78 plar or Warelling, eacludes it is known in the control of t	14.48 /WHRS nter 110	storage litres in neous co n/day):	15.39 within sa (47) ombi boild	15.58 15.58 nme vess ers) ente	18.16 sel	19.82	21.52 0 0	1428.9	(4
instant 6)m= /ater torag committer /ater /) If mempe	22.22 storage e volum munity h vise if no storage nanufact erature fa	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water	20.06 including nd no tale hot water eclared less torage	g any sonk in dwar (this in oss factor 2b, kWh/ye	16.78 plar or Warelling, eacludes in the control of the control o	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day):	15.39 within sa (47)	15.58 15.58 nme vess ers) ente	18.16 sel	19.82	21.52	1428.9	(4)
instant 6)m= /ater torag comitherw /ater a) If m empe nergy	storage e volum munity h vise if no storage anufact erature fa v lost fro anufact	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	20.06 including nd no tathot water eclared logical metals.	g any sonk in dwar (this in 2b, kWh/ye	16.78 Dlar or Warelling, eacludes in the control of the control o	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day): known:	15.39 within sa (47) ombi boild	15.58 15.58 nme vess ers) ente	18.16 sel	19.82 47)	21.52 0 0	1428.9	(2
instant 6)m= /ater torag common therw /ater) If m empe nergy) If m ot wa common	storage e volum munity h vise if no storage anufact erature fa v lost fro anufact ter stora	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de age loss eating s	20.06 including the modern of the storage eclared of factor free sections.	g any sonk in dwar (this in 2b, kWh/ye cylinder I	16.78 Dlar or Warelling, eacludes in the control of the control o	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day): known:	15.39 within sa (47) ombi boild	15.58 15.58 nme vess ers) ente	18.16 sel	19.82 47)	21.52 0 0 0	1428.9	(4)
instanti ater corag comi therv ater) If m empe nergy) If m comi	storage e volum munity h vise if no storage anufact erature fa v lost fro anufact ater stora munity h e factor	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de age loss eating s from Tal	20.06 including the matter of the storage of the section of the s	g any sonk in dwar (this in 2b, kWh/ye cylinder I om Tablen 4.3	16.78 Dlar or Warelling, eacludes in the control of the control o	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day): known:	15.39 within sa (47) ombi boild	15.58 15.58 nme vess ers) ente	18.16 sel	19.82 47)	21.52 0 0 0	1428.9	(4)
instant 6)m= /ater torag comitherv /ater i) If m empe nergy) If m ot wa comitherv olume	storage e volum munity h vise if no storage anufact erature fa v lost fro anufact ater stora munity h e factor	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de age loss eating s from Tal	20.06 including the modern of the storage eclared of factor free sections.	g any sonk in dwar (this in 2b, kWh/ye cylinder I om Tablen 4.3	16.78 Dlar or Warelling, eacludes in the control of the control o	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day): known:	15.39 within sa (47) ombi boild	15.58 15.58 nme vess ers) ente	18.16 sel	19.82 47)	21.52 0 0 0 0	1428.9	(4)
instanti ater corag commit therv ater) If m empe nergy) If m commit commit blum empe	storage e volum munity h vise if no storage nanufact erature fa to lost fro nanufact erature fa munity h e factor erature fa	19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de age loss eating s from Tal	20.06 including the matter of the storage of the section of the s	g any sonk in dwar (this in 2b, kWh/ye cylinder I om Tablon 4.3	olar or Welling, encludes in the control of the con	14.48 /WHRS nter 110 nstantar wn (kWh	storage litres in neous con/day): known:	15.39 within sa (47) ombi boild	15.58 15.58 ame vess ers) ente	18.16 sel er 'O' in (19.82 47)	21.52 0 0 0 0	1428.9	

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated f	for each	month (59)m = ((58) ÷ 36	55 × (41)	m				•	
(modified by	factor f	rom Tab	le H5 if t	here is s	olar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m	_					
(61)m= 50.91	44.31	47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		_
	-	-	-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1973.65	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 61.99	54.16	56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)	m in cald	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal ga			. ,	•	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
, ,	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal ga	ains (see	Table 5	and 5a):		ı			•			eating	(66)
5. Internal games Metabolic gain Jan	rs (Table Feb	2 Table 5 2 5), Wat Mar 119.19	and 5a) ts Apr 119.19	May	Jun 119.19	Jul 119.19	Aug 119.19	Sep 119.19	Oct	Nov	Dec	eating	(66)
5. Internal games Metabolic gain Jan (66)m= 119.19	rs (Table Feb	2 Table 5 2 5), Wat Mar 119.19	and 5a) ts Apr 119.19	May	Jun 119.19	Jul 119.19	Aug 119.19	Sep 119.19	Oct	Nov	Dec	eating	(66) (67)
5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains	realins (see	E Table 5 E 5), Wat Mar 119.19 ted in Ap	ts Apr 119.19 ppendix 10.3	May 119.19 L, equati	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see	Sep 119.19 Table 5 12.25	Oct 119.19	Nov 119.19	Dec 119.19	eating	` ,
5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.83	realins (see	E Table 5 E 5), Wat Mar 119.19 ted in Ap	ts Apr 119.19 ppendix 10.3	May 119.19 L, equati	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see	Sep 119.19 Table 5 12.25	Oct 119.19	Nov 119.19	Dec 119.19	eating	` ,
5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances games	res (Table Feb 119.19 (calcula 16.73 ins (calc	E Table 5 E 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68	ts Apr 119.19 ppendix 10.3 Appendix 195.93	May 119.19 L, equati 7.7 dix L, eq 181.11	Jun 119.19 ion L9 o 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1	Aug 119.19 Iso see 9.13 3a), also	Sep 119.19 Table 5 12.25 see Ta 161.19	Oct 119.19 15.56 ble 5 172.93	Nov 119.19 18.16	Dec 119.19 19.36	eating	(67)
5. Internal games Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances games (68)m= 211.01	res (Table Feb 119.19 (calcula 16.73 ins (calc	E Table 5 E 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68	ts Apr 119.19 ppendix 10.3 Appendix 195.93	May 119.19 L, equati 7.7 dix L, eq 181.11	Jun 119.19 ion L9 o 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1	Aug 119.19 Iso see 9.13 3a), also	Sep 119.19 Table 5 12.25 see Ta 161.19	Oct 119.19 15.56 ble 5 172.93	Nov 119.19 18.16	Dec 119.19 19.36	eating	(67)
5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances games (68)m= 211.01 Cooking gains	res (Table Feb 119.19 (calcula 16.73 ins (calcula 213.2 (calcula 34.92	e Table 5 e 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68 ated in Ap 34.92	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92	May 119.19 L, equati 7.7 dix L, eq 181.11 L, equat	Jun 119.19 ion L9 o 6.5 uation L 167.17	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a)	Aug 119.19 Iso see 9.13 3a), also 155.67	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table	Oct 119.19 15.56 ble 5 172.93	Nov 119.19 18.16	Dec 119.19 19.36 201.7	eating	(67) (68)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92	res (Table Feb 119.19 (calcula 16.73 ins (calcula 213.2 (calcula 34.92	e Table 5 e 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68 ated in Ap 34.92	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92	May 119.19 L, equati 7.7 dix L, eq 181.11 L, equat	Jun 119.19 ion L9 o 6.5 uation L 167.17	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a)	Aug 119.19 Iso see 9.13 3a), also 155.67	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table	Oct 119.19 15.56 ble 5 172.93	Nov 119.19 18.16	Dec 119.19 19.36 201.7	eating	(67) (68)
5. Internal games Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances games (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fames (70)m= 3	res (Table Feb 119.19 (calcula 16.73 ins (calcula 34.92 ns gains 3	ted in Ap 207.68 ulated in Ap 34.92 (Table 5	Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a)	May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.5 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.25 see Ta 161.19 ee Table 34.92	Oct 119.19 15.56 ble 5 172.93 5 34.92	Nov 119.19 18.16 187.76	Dec 119.19 19.36 201.7	eating	(67) (68) (69)
5. Internal games Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances games (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa	res (Table Feb 119.19 (calcula 16.73 ins (calcula 34.92 ns gains 3	ted in Ap 207.68 ulated in Ap 34.92 (Table 5	Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a)	May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.5 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.25 see Ta 161.19 ee Table 34.92	Oct 119.19 15.56 ble 5 172.93 5 34.92	Nov 119.19 18.16 187.76	Dec 119.19 19.36 201.7	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 3 Losses e.g. ev	raporatio	ted in Ap 13.6 207.68 ulated in Ap 34.92 (Table 5	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a) 3 tive valu	May 119.19 L, equati 7.7 dix L, eq 181.11 L, equati 34.92 3 es) (Tab	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92 3	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table 34.92	Oct 119.19 15.56 ble 5 172.93 5 34.92	Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7 34.92	eating	(67) (68) (69) (70)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -95.35	raporatio	ted in Ap 13.6 207.68 ulated in Ap 34.92 (Table 5	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a) 3 tive valu	May 119.19 L, equati 7.7 dix L, eq 181.11 L, equati 34.92 3 es) (Tab	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92 3	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table 34.92	Oct 119.19 15.56 ble 5 172.93 5 34.92	Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7 34.92	eating	(67) (68) (69) (70)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating	reportice solutions (see last (Table Feb 119.19) (calcula 16.73) ins (calcula 34.92) ins gains 3 (calcula 34.92) ins gains 3 (calcula 34.92) ins gains (Table 80.59)	E Table 5 E 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68 ated in Ap 34.92 (Table 5 3 on (negat -95.35 Table 5) 75.62	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a) 3 tive valu -95.35	May 119.19 L, equati 7.7 dix L, equati 181.11 L, equati 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 lle 5) -95.35	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92 3	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table 34.92 3	Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.16 187.76 34.92 3	Dec 119.19 19.36 201.7 34.92 3	eating	(67) (68) (69) (70) (71)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.83 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31	reportice solutions (see last (Table Feb 119.19) (calcula 16.73) ins (calcula 34.92) ins gains 3 (calcula 34.92) ins gains 3 (calcula 34.92) ins gains (Table 80.59)	E Table 5 E 5), Wat Mar 119.19 ted in Ap 13.6 ulated in 207.68 ated in Ap 34.92 (Table 5 3 on (negat -95.35 Table 5) 75.62	ts Apr 119.19 ppendix 10.3 Appendix 195.93 ppendix 34.92 5a) 3 tive valu -95.35	May 119.19 L, equati 7.7 dix L, equati 181.11 L, equati 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 lle 5) -95.35	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92 3	Aug 119.19 Iso see 9.13 3a), also 155.67 , also se 34.92 3	Sep 119.19 Table 5 12.25 See Ta 161.19 ee Table 34.92 3	Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.16 187.76 34.92 3	Dec 119.19 19.36 201.7 34.92 3	eating	(67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9	0.77	X	2.6	x	11.28	x	0.63	x	0.7] =	17.93	(75)
Northeast 0.9	0.77	X	3.15	х	11.28	x	0.63	x	0.7	=	21.72	(75)
Northeast 0.9	0.77	X	2.6	х	22.97	x	0.63	x	0.7	=	36.5	(75)
Northeast 0.9	0.77	X	3.15	x	22.97	x	0.63	x	0.7] =	44.22	(75)
Northeast 0.9	0.77	x	2.6	x	41.38	x	0.63	x	0.7] =	65.76	(75)
Northeast 0.9	0.77	X	3.15	х	41.38	x	0.63	x	0.7	=	79.67	(75)
Northeast 0.9	0.77	X	2.6	х	67.96	x	0.63	x	0.7	=	107.99	(75)
Northeast 0.9	0.77	X	3.15	x	67.96	x	0.63	x	0.7	=	130.84	(75)
Northeast 0.9	0.77	X	2.6	х	91.35	x	0.63	x	0.7	=	145.17	(75)
Northeast 0.9	0.77	X	3.15	х	91.35	x	0.63	x	0.7	=	175.87	(75)
Northeast 0.9	0.77	X	2.6	x	97.38	x	0.63	x	0.7	=	154.76	(75)
Northeast 0.9	0.77	X	3.15	x	97.38	x	0.63	X	0.7	=	187.5	(75)
Northeast 0.9	0.77	X	2.6	х	91.1	x	0.63	x	0.7	=	144.78	(75)
Northeast 0.9	0.77	X	3.15	x	91.1	x	0.63	x	0.7	=	175.4	(75)
Northeast 0.9	0.77	x	2.6	x	72.63	x	0.63	x	0.7] =	115.42	(75)
Northeast 0.9	0.77	X	3.15	x	72.63	x	0.63	x	0.7	=	139.83	(75)
Northeast 0.9	0.77	X	2.6	х	50.42	x	0.63	x	0.7	=	80.13	(75)
Northeast 0.9	0.77	x	3.15	x	50.42	x	0.63	x	0.7] =	97.08	(75)
Northeast 0.9	0.77	X	2.6	x	28.07	x	0.63	x	0.7	=	44.6	(75)
Northeast 0.9	0.77	x	3.15	x	28.07	x	0.63	x	0.7] =	54.04	(75)
Northeast 0.9	0.77	x	2.6	x	14.2	x	0.63	x	0.7] =	22.56	(75)
Northeast 0.9	0.77	X	3.15	x	14.2	x	0.63	x	0.7] =	27.33	(75)
Northeast 0.9	0.77	X	2.6	x	9.21	x	0.63	x	0.7	=	14.64	(75)
Northeast 0.9	0.77	x	3.15	x	9.21	x	0.63	x	0.7] =	17.74	(75)
Southwest _{0.9}	0.77	X	4.39	х	36.79		0.63	x	0.7	=	49.36	(79)
Southwest _{0.9}	0.77	X	0.52	x	36.79		0.63	x	0.7	=	5.85	(79)
Southwest _{0.9}	0.77	X	4.39	x	62.67		0.63	X	0.7	=	84.09	(79)
Southwest _{0.9}	0.77	X	0.52	x	62.67		0.63	x	0.7	=	9.96	(79)
Southwest _{0.9}	0.77	x	4.39	x	85.75		0.63	x	0.7	=	115.05	(79)
Southwest _{0.9}	0.77	X	0.52	x	85.75		0.63	x	0.7	=	13.63	(79)
Southwest _{0.9}	0.77	X	4.39	x	106.25		0.63	X	0.7	=	142.55	(79)
Southwest _{0.9}	0.77	X	0.52	x	106.25		0.63	x	0.7	=	16.89	(79)
Southwest _{0.9}	0.77	X	4.39	х	119.01		0.63	x	0.7	=	159.67	(79)
Southwest _{0.9}	0.77	X	0.52	х	119.01		0.63	x	0.7	=	18.91	(79)
Southwest _{0.9}	0.77	X	4.39	x	118.15		0.63	x	0.7] =	158.51	(79)
Southwest _{0.9}	0.77	X	0.52	x	118.15		0.63	x	0.7] =	18.78	(79)
Southwest _{0.9}	0.77	X	4.39	x	113.91		0.63	x	0.7] =	152.83	(79)
Southwest _{0.9}	0.77	X	0.52	x	113.91		0.63	x	0.7] =	18.1	(79)
Southwest _{0.9}	0.77	X	4.39	x	104.39		0.63	x	0.7] =	140.05	(79)

Southwest	0.77	×	0.5	52	x	10	04.39			0.63	x	0.7	=	16.59	(79)
Southwest	0.77	×	4.3	39	x	9	2.85			0.63	x [0.7		124.57	(79)
Southwest	0.77	x	0.5	52	x	9	2.85			0.63	x	0.7		14.76	(79)
Southwest	0.77	×	4.3	39	x	6	9.27			0.63	x [0.7	=	92.93	(79)
Southwest	0.77	x	0.5	52	x	6	9.27			0.63	x [0.7	=	11.01	(79)
Southwest	0.77	×	4.3	39	x	4	4.07			0.63	x [0.7	=	59.13	(79)
Southwest	0.77	×	0.5	52	x	4	4.07			0.63	x	0.7	=	7	(79)
Southwest	0.77	x	4.3	39	x	3	1.49	Ì		0.63	x	0.7	=	42.25	(79)
Southwest	0.77	x	0.5	52	x	3	1.49			0.63	x	0.7		5	(79)
					_										
Solar gain	s in watts, c	alculated	I for eac	h month				(83)m	= St	ım(74)m .	(82)m				
(83)m= 94	.87 174.76	274.1	398.27	499.62	51	9.55	491.11	411.	.89	316.54	202.58	116.03	79.63		(83)
Total gain:	s – internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts							•	
(84)m= 469	9.78 547.04	632.76	735.33	814.79	81	3.55	771.71	698.	.94	614.94	522.79	461.2	443.67		(84)
7. Mean	nternal tem	perature	(heating	season)										
Tempera	ture during l	neating p	eriods ir	n the livii	ng a	area f	from Tab	ole 9,	Th′	1 (°C)				21	(85)
Utilisation	n factor for g	ains for l	living are	ea, h1,m	(se	e Ta	ble 9a)								
J	an Feb	Mar	Apr	May	,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m=	1 0.99	0.98	0.94	0.82	0	.62	0.46	0.5	3	0.81	0.97	1	1		(86)
Mean inte	ernal tempe	rature in	living ar	ea T1 (fo	ollov	w ste	ns 3 to 7	in T	able	90)		•	•	I.	
	.83 19.99	20.25	20.6	20.87	_	0.97	21	20.9	$\overline{}$	20.91	20.55	20.13	19.8		(87)
Tomporo	turo durina l	nooting p	oriodo ir	root of	du	ممناله	from To	bla C	L	.2 (°C)		1	1		
· —	ture during l	19.99	20	20.01	_	0.01	20.01	20.0	$\overline{}$	20.01	20.01	20	20		(88)
` /		<u> </u>			<u> </u>			<u> </u>		20.01	20.01	1 20			(55)
	factor for g	<u></u>		·	É				_			1	Ι.	1	(00)
(89)m=	1 0.99	0.98	0.92	0.76	0	.54	0.36	0.4	2	0.73	0.96	0.99	1		(89)
	ernal tempe	rature in	the rest	of dwelli	ng	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)		•	1	
(90)m= 18	.43 18.66	19.05	19.55	19.88		20	20.01	20.0	01	19.94	19.49	18.87	18.39		(90)
										f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Mean inte	ernal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	_A × T1	+ (1	– fL	A) × T2					
(92)m= 18	.78 19	19.36	19.82	20.13	20	0.25	20.26	20.2	26	20.19	19.76	19.19	18.75		(92)
Apply adj	ustment to t	he mean	interna	temper	atuı	re fro	m Table	4e,	whe	re appro	priate	-	-		
(93)m= 18	.78 19	19.36	19.82	20.13	20	0.25	20.26	20.2	26	20.19	19.76	19.19	18.75		(93)
8. Space	heating req	uirement													
	the mean in		•		ed	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-calc	culate	
	ition factor f	T				مييا	Jul	۸.		Con	Oct	Nov	Dec		
	an Feb n factor for g	Mar Jains hm	Apr	May		Jun	Jui	A	ug	Sep	Oct	INOV	Dec		
	1 0.99	0.97	0.91	0.77	0	.56	0.39	0.4	5	0.75	0.95	0.99	1		(94)
	nins, hmGm			<u> </u>								1			
	7.72 541.69	615.91	672.21	627.89	45	4.41	300.46	314.	.86	458.64	497.53	456.97	442.2		(95)
· · ·	average exte	ernal tem	perature	from Ta	able	e 8	<u> </u>				<u> </u>	1	1	I	
	.3 4.9	6.5	8.9	11.7		4.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m]	•			
(97)m= 122	5.82 1190.51	1083.23	909.76	701.16	46	5.16	301.76	317.	.56	503.16	761.86	1009.69	1220.13		(97)
	-			-	-		-	-				-		•	

Space heating require	ement fo		nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 564.03 436.01	347.69	171.04	54.51	0	0	0	0	196.67	397.96	578.78		_
						Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2746.68	(98)
Space heating require	ement in	kWh/m²	² /year								36.11	(99)
9a. Energy requiremer	nts – Indi	vidual h	eating s	ystems i	ncluding	micro-C	CHP)					
Space heating:	ot from co	ocondor	v/cupple	montary	cyctom					Γ	0	(201)
Fraction of space hea				memary	-	(202) = 1 -	- (201) =			-	0	(202)
Fraction of total heati		-	, ,			(204) = (204)	` '	(203)] =		-	1 1	(204)
Efficiency of main spa	_	-				(204) - (2	02) X [1	(200)] =		-	93.4	(206)
Efficiency of seconda				a evetom	0/-					-	93.4	(208)
					·	Δ	0	0-4	N.			`′
Jan Feb Space heating require	Mar ement (c	Apr	May d above	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
564.03 436.01	347.69	171.04	54.51	0	0	0	0	196.67	397.96	578.78		
(211) m = {[(98)m x (20	4)1 } x 1	00 ÷ (20)6)	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>			(211)
603.88 466.82	372.26	183.12	58.37	0	0	0	0	210.57	426.09	619.68		,
				!		Tota	l (kWh/yea	ar) =Sum(2	211),15,1012	<u></u>	2940.77	(211)
Space heating fuel (s	econdar	y), kWh/	month							_		
$= \{[(98)m \times (201)]\} \times 1$	1			I	<u> </u>	ı	<u> </u>	<u> </u>	Г			
(215)m= 0 0	0	0	0	0	0	0 Tota	0 I (kWh/yea	0	0	0		7(045)
Water heating						Tota	ii (KVVII/yea	ar) =00m(2	213) _{15,1012}		0	(215)
Output from water hea	ter (calc	ulated a	bove)									
199.05 173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
Efficiency of water hea	ter										80.3	(216)
(217)m= 87.53 87.27	86.67	85.21	82.7	80.3	80.3	80.3	80.3	85.45	87	87.63		(217)
Fuel for water heating,												
(219)m = (64) m x $100(219)$ m = 227.42 199.24	208.74	188.3	187.85	170.39	163.25	181.98	183.99	196.9	206.43	221.82		
						Tota	I = Sum(2	19a) ₁₁₂ =		<u> </u>	2336.31	(219)
Annual totals								k'	Wh/year		kWh/yea	
Space heating fuel use	ed, main	system	1							L	2940.77	
Water heating fuel use	d										2336.31	
Electricity for pumps, f	ans and	electric	keep-ho	t								
central heating pump	:									30		(2300
boiler with a fan-assis	sted flue									45		(230
Total electricity for the	above, k	«Wh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting	•	,								L F	332.6	(232)
												, ,

Energy

kWh/year

Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216 =	635.21 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	504.64 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1139.85 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	172.62 (268)
Total CO2, kg/year	sum (of (265)(271) =	1351.39 (272)

 $TER = 17.77 \tag{273}$

		Hear F	Details:						
A consequently and	Obrida I I a alva all	USELL					OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 on: 1.0.4.10	
Software Hame.		Property					VCISIO	71. 1.0.4.10	
Address :									
1. Overall dwelling dime	ensions:								
Dogomont			a(m²)	l (4 ->		ight(m)	1 (0-)	Volume(m³	_
Basement			74.06	(1a) x	2	2.6	(2a) =	192.56	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.06	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:	main seconda	P1.7	other		total			m³ per hou	•
	heating heating	<u> </u>	other		lotai			m per nou	_
Number of chimneys	0 + 0	+	0	_ =	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0	=	0	X :	20 =	0	(6b)
Number of intermittent fa	ins				3	X	10 =	30	(7a)
Number of passive vents	;			Γ	0	X	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	x -	40 =	0	(7c)
				_					
				_			Air ch	anges per ho	ur —
	ys, flues and fans = $(6a)+(6b)+$				30		÷ (5) =	0.16	(8)
Number of storeys in t	peen carried out or is intended, proce he dwelling (ns)	ea to (17),	otnerwise (continue 11	rom (9) to ((16)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 fo	r masoni	ry const	ruction			0	(11)
	resent, use the value corresponding	to the grea	ter wall are	a (after			!		
deducting areas of opening	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or () 1 (spal	عوام (امد	enter ()				0	(12)
If no draught lobby, en	,	J.1 (3Can	ou), cioc	CITICI O				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	3 M		0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	rise (18) = ((16)				0.41	(18)
	es if a pressurisation test has been de	one or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0 075 v (10\1 –			2	(19)
Infiltration rate incorporate	ting shelter factor		(20) = 1 (21) = (18)		10)] =			0.85	(20)
Infiltration rate modified f	•		(21) - (10) X (20) -				0.34	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	1 ' 1 ' 1	1	1 3	1	1	1			
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
	2)	1	•		1	•	1	ı	
Wind Factor (22a)m = $(2^{2})^{2}$		0.05	1 0 00		4.00	440	140	1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

	0.43 0.42	0.38	0.37	0.33	peed) = 0.33	0.32	0.34	0.37	0.39	0.41	7	
0.44 Calculate effec	tive air change					0.32	0.34	0.37	0.39	0.41	J	
If mechanica	I ventilation:										0	(2
If exhaust air he	at pump using Ap	pendix N, (2	(3b) = (23a	a) × Fmv (e	quation (N	N5)) , othe	rwise (23b) = (23a)			0	(2
If balanced with	heat recovery: eff	iciency in %	allowing f	or in-use fa	actor (from	n Table 4h) =				0	(2
a) If balance	d mechanical v	/entilation	with he	at recove	ry (MVI	HR) (24a	a)m = (22)	2b)m + (2	23b) × [1 – (23c) ÷ 100]	
24a)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
· —	d mechanical v	/entilation	without	heat rec	overy (N	ЛV) (24b	m = (22)	2b)m + (2	23b)		7	
24b)m= 0	0 0	0	0	0	0	0	0	0	0	0	_	(2
,	ouse extract version $< 0.5 \times (23b)$,		•	•				.5 × (23b)			
24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
,	ventilation or w		•					0.5]			_	
24d)m= 0.6	0.59 0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58		(2
Effective air	change rate - e	enter (24a) or (24k	o) or (24d	c) or (24	d) in box	(25)	-		-	_	
25)m= 0.6	0.59 0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58]	(2
3. Heat losses	and heat loss	paramet	er:									
LEMENT	Gross area (m²)	Openin m	gs	Net Ard A ,n		U-valı W/m2		A X U (W/k	()	k-valu kJ/m²·		A X k kJ/K
oors	,			2.6	x	1	=	2.6	<u>,</u>			(2
/indows Type	1			2.52	= x1,	/[1/(1.4)+	0.04] =	3.34	Ħ			(2
/indows Type	2			3.05	= x1,	/[1/(1.4)+	0.04] =	4.04	Ħ			(2
/indows Type	3			4.26	= x1,	/[1/(1.4)+	0.04] =	5.65	Ħ			(2
/indows Type	4			0.5		/[1/(1.4)+	0.04] =	0.66	Ħ			(2
/alls Type1	67.78	15.9		51.88	x	0.18	i	9.34	= [\neg \vdash	(2
			=		=		╡┇	3.94	≓ ¦		=	
Valls Type2	24.47	2.6		21.87	X	0.18		J.J .				[(4
Valls Type2 Valls Type3	5.93	2.6	\blacksquare	21.87 5.93	×				7 }			
	5.93			5.93	X	0.18	=	1.07				(2
/alls Type3 oof	5.93	0		5.93	x x		=					(2
Valls Type3 coof otal area of el	5.93	0		5.93 19.72 117.9	x x	0.18	=	1.07				(2
Valls Type3	5.93	0		5.93 19.72 117.9 12.38	x x	0.18	=	1.07				(3)
/alls Type3 oof otal area of el arty wall arty floor	5.93	0		5.93 19.72 117.9 12.38 74.06	x x x x x	0.18	=	1.07				(3)
/alls Type3 oof otal area of el arty wall arty floor arty ceiling	5.93 19.72 ements, m²	0 0		5.93 19.72 117.9 12.38 74.06 54.34 alue calcula	x x x x	0.18 0.13	= [1.07 2.56	[]	n paragrap	h 3.2	(2
/alls Type3 oof otal area of el arty wall arty floor arty ceiling for windows and include the areas	5.93 19.72 ements, m ²	0 0		5.93 19.72 117.9 12.38 74.06 54.34 alue calcula	x x x x attend using	0.18 0.13	= [= [= [/[(1/U-valu	1.07 2.56	[] [s given in	paragrap	h 3.2	(3)
/alls Type3 oof otal area of el arty wall arty floor arty ceiling for windows and include the area abric heat loss	5.93 19.72 Tements, m² roof windows, uses on both sides of	0 0		5.93 19.72 117.9 12.38 74.06 54.34 alue calcula	x x x x attend using	0.18 0.13	= [= [] = [] = []/[(1/U-value) + (32) =	1.07 2.56				(3) (3) (3) (3)
/alls Type3 oof otal area of el arty wall arty floor arty ceiling for windows and include the area abric heat loss eat capacity (5.93 19.72 ements, m² roof windows, use s on both sides of s, W/K = S (A :	e effective will internal wall	ls and par	5.93 19.72 117.9 12.38 74.06 54.34 alue calculatitions	x x x x attend using	0.18 0.13	= [= [- [- [(1/U-value)]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	1.07 2.56 0) + (32a).		40.5	(3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (

if details of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total fabric he	at loss							(33) +	(36) =			60.57	(37)
Ventilation hea	at loss ca	alculated	l monthly	/				` ′	= 0.33 × (25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 37.92	37.68	37.44	36.35	36.14	35.18	35.18	35.01	35.55	36.14	36.56	36.99		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 98.48	98.25	98.01	96.91	96.71	95.75	95.75	95.57	96.12	96.71	97.12	97.56		
Heat loss para	meter (F	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	96.91	(39)
(40)m= 1.33	1.33	1.32	1.31	1.31	1.29	1.29	1.29	1.3	1.31	1.31	1.32		
									Average =	Sum(40) ₁ .	12 /12=	1.31	(40)
Number of day	s in mor	nth (Tab	le 1a)						T	1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ener	rgy requi	rement:								kWh/ye	ear:	
	_											ı	
Assumed occu if TFA > 13.9			[1 ovn	(0 0003	240 v (TE	-Λ 12 Ω'	\2\1 + O (1012 v (TEA 12		34		(42)
if TFA £ 13.9		+ 1.76 X	[ı - exp	(-0.0003	49 X (11	-A -13.9)2)] + 0.0) X C I U	IFA - 13.	.9)			
Annual averag	•	ater usag	ge in litre	s per da	y Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
Reduce the annua	_				_	_	ò achieve	a water us	se target o				` ,
not more that 125	litres per p	person per	day (all w	ater use, h	not and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
									Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instantaneous w	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)) to (61)			'		
(46)m= 21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water storage													
Storage volum	, ,		•			_		ame ves	sel		0		(47)
If community h	•			•			` '						
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage		odorod k	ooo foot	or io kno	(Ic\A/k	2/dox4):							(40)
a) If manufact				JI IS KIIO	WII (KVVI	i/uay).					0		(48)
Temperature fa											0		(49)
Energy lost fro		_	-		or io not		(48) x (49)) =			0		(50)
b) If manufactHot water stora			-								0		(51)
If community h	_			`		• /					-		(= -)
Volume factor	_										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (_	•							-	0		(55)

water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	55 × (41)	m				•	
(modified by	/ factor fi	rom Tab	le H5 if t	here is s	solar wat	ter heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat req	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	l lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (€)				_	
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
					•	•	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include (57)	m in cald	culation of	of (65)m	only if c	vlindor i	·						•	
			31 (00)111	Offiny II C	yımden i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see		. ,	•	ylinder is	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
	·	e Table 5	and 5a	•	gillider is	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gair Metabolic gair Jan	·	e Table 5	and 5a	•	Jun	Jul	Aug	or hot w	ater is fr	Nov	munity h	eating	
Metabolic gair	ns (Table	Table 5	and 5a):					•			eating	(66)
Metabolic gair	rs (Table Feb	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	May	Jun 117.03	Jul 117.03	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
Metabolic gair Jan (66)m= 117.03	rs (Table Feb	2 Table 5 2 5), Wat Mar 117.03	and 5a) ts Apr 117.03	May	Jun 117.03	Jul 117.03	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
Metabolic gair Jan (66)m= 117.03 Lighting gains	Feb 117.03 (calcula	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a 6.88	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov 117.03	Dec 117.03	eating	, ,
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44	Feb 117.03 (calcula	**E Table 5	ts Apr 117.03 ppendix 10.09	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a 6.88	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov 117.03	Dec 117.03	eating	, ,
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga	reb 117.03 (calcula 16.38 lins (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equat 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(67)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58	reb 117.03 (calcula 16.38 lins (calcula 208.73	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32	ts Apr 117.03 ppendix 10.09 Appendix 191.82	May 117.03 L, equat 7.54 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55	Aug 117.03 Iso see 8.94 3a), also	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(67)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	reb (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 c (calcula 34.7	Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31 5	Nov 117.03 17.78	Dec 117.03 18.95	eating	(67) (68)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains	reb (Table Feb 117.03 (calcula 16.38 tins (calcula 208.73 c (calcula 34.7	Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7	ts Apr 117.03 ppendix 10.09 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 of 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a)	Aug 117.03 Iso see 8.94 3a), also 152.4	Sep 117.03 Table 5 12 see Ta 157.81	Oct 117.03 15.23 ble 5 169.31 5	Nov 117.03 17.78	Dec 117.03 18.95	neating	(67) (68)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3	res (Table Feb 117.03 (calcula 16.38 Lins (calcula 208.73 (calcula 34.7 Lins gains 3	203.32 ulated in Ap 204.7 (Table 5	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	res (Table Feb 117.03 (calcula 16.38 Lins (calcula 208.73 (calcula 34.7 Lins gains 3	203.32 ulated in Ap 204.7 (Table 5	Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a)	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62	reb (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 c (calcula 34.7 ns gains 3 raporatio -93.62	ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	eating	(67) (68) (69) (70)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev	reb (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 c (calcula 34.7 ns gains 3 raporatio -93.62	ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7	Oct 117.03 15.23 ble 5 169.31 5 34.7	Nov 117.03 17.78 183.82 34.7	Dec 117.03 18.95 197.47 34.7	neating	(67) (68) (69) (70)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62 Water heating (72)m= 82.37	res (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 s (calcula 34.7 ns gains 79.62 gains (T	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negation of the companion of t	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7 3	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7 3	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3 -93.62	Dec 117.03 18.95 197.47 34.7 3 -93.62 80.3	eating	(67) (68) (69) (70) (71)
Metabolic gairs Jan (66)m= 117.03 Lighting gains (67)m= 18.44 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -93.62 Water heating	res (Table Feb 117.03 (calcula 16.38 ins (calcula 208.73 s (calcula 34.7 ns gains 79.62 gains (T	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.32 ulated in 203.32 uted in Ap 34.7 (Table 5 3 on (negation of the companion of t	ts Apr 117.03 ppendix 10.09 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	May 117.03 L, equat 7.54 dix L, eq 177.31 L, equat 34.7 3 es) (Tab	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.88 13 or L1: 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.94 3a), also 152.4 , also se 34.7 3	Sep 117.03 Table 5 12 see Ta 157.81 ee Table 34.7 3	Oct 117.03 15.23 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.78 183.82 34.7 3 -93.62	Dec 117.03 18.95 197.47 34.7 3 -93.62 80.3	neating	(67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.52	x	11.28	x	0.63	x	0.7] =	17.38	(75)
Northeast _{0.9x} 0.77	x	3.05	x	11.28	X	0.63	х	0.7	=	21.03	(75)
Northeast 0.9x 0.77	x	2.52	x	22.97	x	0.63	х	0.7	=	35.38	(75)
Northeast 0.9x 0.77	x	3.05	x	22.97	x	0.63	x	0.7] =	42.82	(75)
Northeast 0.9x 0.77	х	2.52	x	41.38	x	0.63	х	0.7	=	63.74	(75)
Northeast 0.9x 0.77	x	3.05	x	41.38	x	0.63	х	0.7	=	77.14	(75)
Northeast _{0.9x} 0.77	x	2.52	x	67.96	X	0.63	х	0.7	=	104.67	(75)
Northeast _{0.9x} 0.77	x	3.05	x	67.96	x	0.63	x	0.7	=	126.69	(75)
Northeast _{0.9x} 0.77	x	2.52	x	91.35	x	0.63	х	0.7	=	140.7	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.35	x	0.63	x	0.7	=	170.29	(75)
Northeast _{0.9x} 0.77	x	2.52	x	97.38	x	0.63	x	0.7	=	150	(75)
Northeast _{0.9x} 0.77	x	3.05	x	97.38	x	0.63	x	0.7	=	181.55	(75)
Northeast _{0.9x} 0.77	x	2.52	x	91.1	x	0.63	x	0.7	=	140.32	(75)
Northeast _{0.9x} 0.77	x	3.05	x	91.1	x	0.63	x	0.7	=	169.83	(75)
Northeast 0.9x 0.77	x	2.52	x	72.63	x	0.63	x	0.7	=	111.87	(75)
Northeast _{0.9x} 0.77	x	3.05	x	72.63	x	0.63	x	0.7	=	135.39	(75)
Northeast _{0.9x} 0.77	x	2.52	x	50.42	x	0.63	x	0.7	=	77.66	(75)
Northeast _{0.9x} 0.77	x	3.05	x	50.42	x	0.63	x	0.7	=	94	(75)
Northeast _{0.9x} 0.77	x	2.52	x	28.07	x	0.63	x	0.7	=	43.23	(75)
Northeast _{0.9x} 0.77	X	3.05	x	28.07	X	0.63	х	0.7	=	52.32	(75)
Northeast 0.9x 0.77	x	2.52	x	14.2	x	0.63	х	0.7	=	21.87	(75)
Northeast _{0.9x} 0.77	X	3.05	x	14.2	X	0.63	х	0.7	=	26.47	(75)
Northeast _{0.9x} 0.77	x	2.52	x	9.21	x	0.63	x	0.7	=	14.19	(75)
Northeast _{0.9x} 0.77	x	3.05	x	9.21	x	0.63	x	0.7	=	17.18	(75)
Southwest _{0.9x} 0.77	x	4.26	x	36.79		0.63	X	0.7	=	47.9	(79)
Southwest _{0.9x} 0.77	x	0.5	x	36.79]	0.63	X	0.7	=	5.62	(79)
Southwest _{0.9x} 0.77	x	4.26	x	62.67		0.63	X	0.7	=	81.6	(79)
Southwest _{0.9x} 0.77	X	0.5	X	62.67		0.63	x	0.7	=	9.58	(79)
Southwest _{0.9x} 0.77	X	4.26	x	85.75]	0.63	X	0.7	=	111.64	(79)
Southwest _{0.9x} 0.77	X	0.5	X	85.75		0.63	X	0.7	=	13.1	(79)
Southwest _{0.9x} 0.77	X	4.26	X	106.25		0.63	X	0.7	=	138.33	(79)
Southwest _{0.9x} 0.77	X	0.5	x	106.25		0.63	x	0.7	=	16.24	(79)
Southwest _{0.9x} 0.77	x	4.26	x	119.01		0.63	X	0.7	=	154.94	(79)
Southwest _{0.9x} 0.77	x	0.5	x	119.01		0.63	X	0.7	=	18.19	(79)
Southwest _{0.9x} 0.77	x	4.26	x	118.15]	0.63	x	0.7	=	153.82	(79)
Southwest _{0.9x} 0.77	x	0.5	x	118.15]	0.63	x	0.7	=	18.05	(79)
Southwest _{0.9x} 0.77	x	4.26	x	113.91]	0.63	x	0.7	=	148.3	(79)
Southwest _{0.9x} 0.77	x	0.5	x	113.91]	0.63	x	0.7	=	17.41	(79)
Southwest _{0.9x} 0.77	X	4.26	x	104.39]	0.63	X	0.7	=	135.91	(79)

Southwest _{0.9}	0.77	X	0.	5	x	10	04.39] [0.63	x	0.7	=	15.95	(79)
Southwest _{0.9}	0.77	x	4.2	26	x [9	2.85] [0.63	x [0.7	=	120.88	(79)
Southwest _{0.9}	0.77	x	0.	5	x [9	2.85			0.63	x	0.7	=	14.19	(79)
Southwest _{0.9}	0.77	x	4.2	26	x [6	9.27] [0.63	x [0.7	=	90.18	(79)
Southwest _{0.9}	0.77	x	0.	5	x [6	9.27] [0.63	x [0.7	=	10.58	(79)
Southwest _{0.9}	0.77	x	4.2	26	x [4	4.07			0.63	x [0.7	=	57.38	(79)
Southwest _{0.9}	0.77	x	0.	5	x [4	4.07			0.63	x [0.7	=	6.73	(79)
Southwest _{0.9}	0.77	x	4.2	26	x [3	1.49			0.63	×	0.7		40.99	(79)
Southwest _{0.9}	0.77	x	0.	5	x [3	1.49			0.63	×	0.7		4.81	(79)
					_										
Solar gains i	n watts, c	alculated	for eac	h month				(83)m	= Su	ım(74)m .	(82)m				
(83)m= 91.94	169.36	265.62	385.92	484.12	503	3.42	475.86	399.	.12	306.73	196.32	112.44	77.18		(83)
Total gains -	- internal a	and solar	(84)m =	= (73)m -	+ (8	3)m	, watts								
(84)m= 460.4	4 535.26	618.13	717.23	793.94	792	2.46	751.75	681.	.37	600.13	511.13	451.77	435.01		(84)
7. Mean into	ernal tem	oerature	(heating	season)										
Temperatur			`		<i>'</i>	rea f	rom Tab	ole 9,	Th1	1 (°C)				21	(85)
Utilisation fa	•	•			•					, ,					
Jan	 	Mar	Apr	May	r i	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 1	0.99	0.99	0.96	0.87	0).7	0.54	0.6	1	0.86	0.98	1	1		(86)
Mean interr	al tempe	rature in	living ar	ea T1 (fo	llov	v ste	ns 3 to 7	in T	ahle	9c)			1	_	
(87)m= 19.54		20	20.4	20.74).93	20.98	20.9	$\overline{}$	20.82	20.38	19.89	19.52		(87)
` '					<u> </u>			<u> </u>				1			, ,
Temperatur		neating p	erioas ir	19.84	_	9.85	19.85	19.8	$\overline{}$	12 (°C) 19.84	19.84	19.83	19.83		(88)
(88)m= 19.82	19.02	19.02	19.03	19.04	19	1.00	19.00	19.0	55	19.04	19.04	19.63	19.03		(00)
Utilisation fa					_	$\overline{}$								ı	
(89)m= 1	0.99	0.98	0.94	0.82	0).6	0.41	0.4	.7	0.78	0.96	0.99	1		(89)
Mean intern	nal tempe	rature in	the rest	of dwelli	ng ⁻	T2 (fo	ollow ste	ps 3	to 7	in Tabl	e 9c)		-		
(90)m= 17.89	18.14	18.56	19.14	19.59	19	9.8	19.84	19.8	84	19.7	19.11	18.41	17.86		(90)
										f	LA = Liv	ng area ÷ (4) =	0.26	(91)
Mean interr	nal tempei	rature (fo	r the wh	ole dwe	lling	ı) = fL	_A × T1	+ (1 -	– fL	A) × T2					
(92)m= 18.33	<u> </u>	18.94	19.47	19.89	Ť	0.1	20.14	20.		19.99	19.44	18.8	18.3		(92)
Apply adjus	tment to t	he mean	interna	l temper	atur	e fro	m Table	4e, v	whe	re appro	priate				
(93)m= 18.33	18.55	18.94	19.47	19.89	20	0.1	20.14	20.1	13	19.99	19.44	18.8	18.3		(93)
8. Space he	eating req	uirement													
Set Ti to the			•		ned a	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	(76)m an	d re-cald	culate	
the utilisation	1	<u> </u>			_					_	_	1	Ι_	Ī	
Jan		Mar	Apr	May	_ J	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisation fa	0.99	1		0.82	_	62	0.44	0.5	- I	0.0	0.06	T 0.00	<u> </u>	Ī	(94)
(0.)		0.98	0.93		0.	.63	0.44	0.5	''	8.0	0.96	0.99	1		(34)
Useful gain (95)m= 458.2		, VV = (9 ² 603.44	667.64	649.91	10	96.2	334.09	347.	95	477.5	490.11	447.58	433.36		(95)
Monthly ave				<u> </u>			334.03	047.	.55	411.5	430.11	1447.50	400.00		(00)
(96)m= 4.3	4.9	6.5	8.9	11.7		4.6	16.6	16.	4	14.1	10.6	7.1	4.2		(96)
Heat loss ra				<u> </u>								1		1	` ,
	17 1341.18			791.84		6.42	338.99	356.	_ т	566.14	855.33	1136.23	1375.17		(97)
, ,	1 -											1	I.	1	

98)m= 686.91	545.1	458.27	256.64	105.6	0	0.02	24 x [(97)	0	271.72	495.83	700.71		
										r) = Sum(9	L	3520.78	(98)
Space heatin	g requir	ement in	kWh/m²	/year							Ī	47.54	(99)
a. Energy red	quiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	HP)			_		
Space heatir	_										_		_
Fraction of sp					mentary	system						0	(20
Fraction of sp			-	• •			(202) = 1 -	` '			L	1	(20)
Fraction of to		•	-				(204) = (204)	02) x [1 –	(203)] =			1	(20
Efficiency of I	-											93.4	(20
Efficiency of s	seconda	ry/supple	ementar	y heating	g system	າ, %						0	(20
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heatin	ř	· `		· ·					074 70	405.00	700 74		
686.91	545.1	458.27	256.64	105.6	0	0	0	0	271.72	495.83	700.71		
211)m = {[(98 735.45)m x (20 583.61	490.65	00 ÷ (20 274.78	113.06	0	0	T 0	0	290.93	530.87	750.22		(21
733.43	363.01	490.03	214.10	113.00	0	0				211) _{15.1012}		3769.57	(21
Space heatin {[(98)m x (20	•		• •	montn 0	0	0	0 Tota	0 L (kWh/yor	0	0	0		7 /24
							Tota	I (KWN/yea	ar) =Sum(2	215) _{15,1012}	.	0	(21
later heating utput from w		ter (calc	ulated al	nove)									
196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
fficiency of w	ater hea	iter					•					80.3	(21
17)m= 87.94	87.75	87.32	86.26	84.13	80.3	80.3	80.3	80.3	86.28	87.5	88.02		(21
uel for water 219)m <u> = (64)</u>	0					_			_				
223.79 223.79	195.9	204.84	183.92	182.56	168.46	161.4	179.92	181.91	192.78	202.93	218.34		
							Tota	I = Sum(2	19a) ₁₁₂ =			2296.75	(21
nnual totals pace heating		nd main	cyctom	1					k'	Wh/year	Г	kWh/yea	<u>r</u>
			System	1							L	3769.57	╡
ater heating											L	2296.75	
lectricity for p	oumps, f	ans and	electric	keep-ho	t								
central heatin	ig pump	:									30		(23
ooiler with a f	an-assis	sted flue									45		(23
ntal electricity	y for the	above, k	kWh/yea	r			sum	of (230a).	(230g) =			75	(23
otal electricity													
lectricity for li	ighting										Ī	325.7	(23

Energy

kWh/year

Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216	=	814.23	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	496.1	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1310.33	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	169.04	(268)
Total CO2, kg/year	sum o	of (265)(271) =		1518.29	(272)

TER = 20.5 (273)

		l Isar I	Details:						
Assessor Name:	Chris Hocknell	— 036 1-1	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	Flat 3-2	2-Lean				
Address: 1. Overall dwelling dime	ncione:								
1. Overall dwelling diffle	11510115.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) :	76.06	(4)			_		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
2. Ventuation rate.	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		- + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0		0	j = [0	x	20 =	0	(6b)
Number of intermittent fa	ns			, <u> </u>	3	x .	10 =	30	(7a)
Number of passive vents				Ē	0	x .	10 =	0	(7b)
Number of flueless gas fi	res			F	0	x	40 =	0	(7c)
				_					
							Air ch	nanges per ho	our —
•	ys, flues and fans = (6a)+(6b)+(een carried out or is intended, procee			continue fr	30		÷ (5) =	0.15	(8)
Number of storeys in the		id 10 (17),	ourier wise t	onunae n	om (9) to	(10)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are pi deducting areas of openir	resent, use the value corresponding t ngs); if equal user 0.35	o tne grea	ter wall are	a (atter					
·	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	5	(17)
•	ity value, then $(18) = [(17) \div 20] + (18)$							0.4	(18)
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed		_	7(40)
Number of sides sheltere Shelter factor	u		(20) = 1 -	[0.0 75 x (1	19)] =			0.78	(19) (20)
Infiltration rate incorporat	ing shelter factor		(21) = (18) x (20) =				0.31	(21)
Infiltration rate modified for	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7				•			1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltration	ate (allow	ing for sh	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.4 0.39		0.34	0.33	0.3	0.3	0.29	0.31	0.33	0.35	0.37		
Calculate effective a	•	rate for t	he appli	cable ca	se	•	•	•		•	•	
If mechanical ven		andiv N. (2	3h) - (23	a) × Emy (c	auation (VEVV otho	nuico (22h	n) = (22a)			0	(23a)
If balanced with heat r) – (23a)			0	(23b)
	-	-	_					Ob.\	20h\ [/	(00.0)	0 . 4001	(23c)
a) If balanced med (24a)m= 0 0	onanicai ve	entilation 0	with ne	at recove		$\frac{HR}{0}$ (248	$\frac{1}{100} = \frac{1}{100}$	20)m + (2 0	23b) x [$\frac{1 - (230)}{0}$	÷ 100] 	(24a)
(1)		<u> </u>			<u> </u>							(214)
b) If balanced med (24b)m= 0 0		0	0	0	0	0	0	0	0	0	1	(24b)
	Ļ	<u> </u>		<u> </u>		<u> </u>			0			(2.0)
c) If whole house if (22b)m < 0.9			•	•				.5 × (23b)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventila	 ation or wh	nole hous	e positiv	ve input	ventilatio	on from I	oft	<u> </u>		!	l	
if $(22b)m = 1$,			•	•				0.5]				
(24d)m= 0.58 0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air chang	je rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.58 0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)
3. Heat losses and	heat loss	paramet	er.									
ELEMENT G	ross ea (m²)	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/ł	〈)	k-value kJ/m²-ł		A X k kJ/K
Doors				2.6	x	1	= I	2.6				(26)
Windows Type 1												
Windows Tune 2				2.6	x1	/[1/(1.4)+	0.04] =	3.45				(27)
Windows Type 2				3.15	╡,	/[1/(1.4)+ /[1/(1.4)+		3.45 4.18				(27) (27)
Windows Type 2 Windows Type 3					x1		0.04] =					, ,
				3.15	x1	/[1/(1.4)+	0.04] =	4.18 5.82				(27) (27)
Windows Type 3 Windows Type 4	8.14	16.4	1	3.15 4.39 0.52	x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] =	4.18 5.82 0.69			-	(27) (27) (27)
Windows Type 3 Windows Type 4 Walls Type1	8.14	16.4	1	3.15 4.39 0.52 21.73	x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 	0.04] = 0.04] = 0.04] = = = =	4.18 5.82 0.69 3.91				(27) (27) (27) (29)
Windows Type 3 Windows Type 4 Walls Type1 Walls Type2 2	3.92	2.6	1	3.15 4.39 0.52 21.73 21.32	x1 x1 x1 x1 x2 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84				(27) (27) (27) (29) (29)
Windows Type 3 Windows Type 4 Walls Type1 Walls Type2 Walls Type3	3.92	2.6	1	3.15 4.39 0.52 21.73 21.32 5.95	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07				(27) (27) (27) (29) (29) (29)
Windows Type 3 Windows Type 4 Walls Type1 Walls Type2 Walls Type3 Walls Type4 2	3.92 5.95 9.51	2.6 0	1	3.15 4.39 0.52 21.73 21.32 5.95 29.51	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31				(27) (27) (27) (29) (29) (29) (29)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Walls Type4 2 Roof 2	3.92 5.95 9.51	2.6	1	3.15 4.39 0.52 21.73 21.32 5.95 29.51	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07				(27) (27) (27) (29) (29) (29) (29) (30)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Walls Type4 2 Roof 2 Total area of element	3.92 5.95 9.51	2.6 0	1	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45	x1 x1 x1 x1 x2 x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66				(27) (27) (27) (29) (29) (29) (29) (30) (31)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 2 Walls Type4 2 Roof 2 Total area of element Party wall	3.92 5.95 9.51	2.6 0	1	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9	x1 x1 x1 x1 x2 x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31				(27) (27) (27) (29) (29) (29) (29) (30) (31) (32)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Roof 2 Total area of elemer Party wall Party floor	3.92 5.95 9.51	2.6 0	1	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66				(27) (27) (27) (29) (29) (29) (29) (30) (31) (32) (32a)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Walls Type4 2 Roof 2 Total area of elemer Party wall Party floor Party ceiling	3.92 5.95 9.51 0.45 nts, m ²	2.6 0 0		3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06	x1 x1 x1 x1 x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18 0.13	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66				(27) (27) (27) (29) (29) (29) (29) (30) (31) (32)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Walls Type4 2 Roof 2 Total area of element Party wall Party floor	3.92 5.95 9.51 0.45 nts, m ²	2.6 0 0 0	indow U-va	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18 0.13	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66	s given in	paragraph		(27) (27) (27) (29) (29) (29) (29) (30) (31) (32) (32a)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Roof 2 Total area of element Party wall Party floor Party ceiling * for windows and roof wall	3.92 5.95 9.51 0.45 nts, m²	2.6 0 0 0	indow U-va	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18 0.18 0.13	0.04] = 0.04] = 0.04] = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66	s given in	paragraph	3.2	(27) (27) (27) (29) (29) (29) (29) (30) (31) (32) (32a) (32b)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Roof 2 Total area of element Party wall Party floor Party ceiling * for windows and roof windows and windows and windows and windows and windows and windows and windows and windows and windows and windows a	3.92 5.95 9.51 0.45 onts, m² indows, use eath sides of ints K = S (A x	2.6 0 0 0	indow U-va	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04]	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66				(27) (27) (27) (29) (29) (29) (30) (31) (32) (32a) (32b)
Windows Type 3 Windows Type 4 Walls Type1 3 Walls Type2 2 Walls Type3 4 Roof 2 Total area of element Party wall Party floor Party ceiling * for windows and roof windows and roo	3.92 5.95 9.51 0.45 onts, m ² sindows, use exports sides of introduced in K = S (A x x S(A x k))	2.6 0 0 0 over the state of the	ndow U-va	3.15 4.39 0.52 21.73 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61 alue calculatitions	x1 x1 x1 x1 x2 x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = = = = = = =	4.18 5.82 0.69 3.91 3.84 1.07 5.31 2.66	2) + (32a).		41.15	(27) (27) (29) (29) (29) (29) (30) (31) (32) (32a) (32b)

can be u	ısed instea	ad of a dei	tailed calc	ulation.										
					using Ap	pendix I	K						20.43	(36)
	_	•	•		= 0.15 x (3	•								(***)
Total fa	abric hea	at loss							(33) +	(36) =			61.58	(37)
Ventila	tion hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	37.77	37.57	37.38	36.46	36.28	35.48	35.48	35.34	35.79	36.28	36.63	37		(38)
Heat tr	ansfer c	oefficier	nt, W/K		<u>-</u>	-	-	-	(39)m	= (37) + (37)	38)m	-		
(39)m=	99.35	99.15	98.96	98.04	97.86	97.06	97.06	96.92	97.37	97.86	98.21	98.58		
Heat Ic	ss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39)₁ · (4)	12 /12=	98.04	(39)
(40)m=	1.31	1.3	1.3	1.29	1.29	1.28	1.28	1.27	1.28	1.29	1.29	1.3		
Numbe	er of day	s in mor	nth (Tab	le 1a)	-		-	-	,	Average =	Sum(40) ₁	12 /12=	1.29	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
					_	-	-	-		-	-	-		
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
A cours	ed occu	nanov 1	NI.										1	(42)
if TF		9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		38	J	(42)
Annua	l averag	e hot wa						(25 x N)				0.82]	(43)
		_			5% if the a ater use, l	_	_	to achieve	a water us	se target o	f		•	
notmore	. 1					i .	•	<u> </u>	0	0.1			1	
Hot wate	Jan er usage ir	Feb	Mar day for ea	Apr ach month	May $Vd, m = fa$	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	1	
(44)111=	55.5	30.21	32.00	00	00.07	01.70	01.73	00.07			m(44) ₁₁₂ =		1089.8	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600						
(45)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47]	
							!	!		Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
If instant		ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)	•			1	
(46)m=	22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
	storage e volum		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
•		, ,			velling, e		_		ATTIO VOO	001		0		(47)
	-	_			_			mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:											_	
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0]	(49)
			storage	-		:-		(48) x (49)) =			0]	(50)
•				-	loss fact le 2 (kWl							0	1	(51)
		_	ee secti		10 2 (NVVI	, C /Uc	^У <i>)</i>				<u></u>	0	J	(51)
	e factor	-										0]	(52)
Tempe	rature fa	actor fro	m Table	2b								0]	(53)

Energy lost from w	_	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54)	, ,									0		(55)
Water storage loss	calculated	for each	month			((56)m = (55) × (41)r	n	•	,		
(56)m = 0		0	0	0	0	0	0	0	0	0		(56)
If cylinder contains ded	cated solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	(annual) from	om Table	e 3							0		(58)
Primary circuit loss			•	•	` '	, ,						
(modified by fact	1	1	1								l	(50)
(59)m= 0 (0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcula	ed for each	month ((61)m =	(60) ÷ 36	65 × (41))m			_			
(61)m= 50.91 44.	31 47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat required	for water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05 173	88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input calcul	ted using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	contributi	ion to wate	er heating)	•	
(add additional line	s if FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	neater											
(64)m= 199.05 173	88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
	•		•			Outp	out from wa	ater heate	r (annual) ₁	12	1973.65	(64)
		1-14/1- /	11 - 0 - 01	- /	\							
Heat gains from wa	iter neating	, kvvn/m	onth 0.28	5 [0.85	× (45)m	ı + (61)m	า] + 0.8 x	: [(46)m	+ (57)m	+ (59)m]	
Heat gains from wa (65) m= 61.99 $54.$		49.73	48.07	42.17	× (45)m 40.15	+ (61)m 45	1] + 0.8 x 45.5	52.04	+ (57)m 55.8	+ (59)m 60.43]	(65)
	16 56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
(65)m= 61.99 54. include (57)m in	56.26 calculation	49.73 of (65)m	48.07 only if c	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
(65)m= 61.99 54. include (57)m in 5. Internal gains	56.26 calculation	49.73 of (65)m 5 and 5a	48.07 only if c	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (T	56.26 calculation see Table sable 5), Wa	49.73 of (65)m 5 and 5a	48.07 only if c	42.17 ylinder i	40.15 s in the c	45 dwelling	45.5 or hot w	52.04	55.8 om com	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (T	56.26 calculation see Table 5 hable 5), Waleb Mar	49.73 of (65)m 5 and 5a	48.07 only if c	42.17	40.15	45	45.5	52.04 ater is fr	55.8	60.43 munity h		(65)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119	56.26 calculation see Table sable 5), Wareb Mar	49.73 of (65)m 5 and 5a tts Apr 119.19	48.07 only if c): May 119.19	42.17 ylinder is Jun 119.19	40.15 s in the c	45 dwelling Aug 119.19	45.5 or hot w Sep 119.19	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale	56.26 calculation see Table 9 able 5), Wa b Mar 19 119.19 culated in A	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix	48.07 only if c): May 119.19 L, equati	Jun 119.19	40.15 s in the o	45 dwelling Aug 119.19 lso see	45.5 or hot w Sep 119.19 Table 5	52.04 ater is fr Oct 119.19	55.8 om com	60.43 munity h		
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16.	to the second se	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3	48.07 only if c): May 119.19 L, equati 7.7	42.17 ylinder is Jun 119.19 ion L9 of	40.15 s in the c Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see 9.13	45.5 or hot w Sep 119.19 Table 5	52.04 ater is fr Oct 119.19	55.8 om com Nov 119.19	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains (see Table sable 5), Wareb Mar 119.119.119.113.6	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append	May 119.19 L, equati 7.7	Jun 119.19 ion L9 of 6.5 uation L	40.15 s in the c Jul 119.19 r L9a), a 7.02	Aug 119.19 Iso see 9.13 3a), also	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal	52.04 ater is fr Oct 119.19 15.56 ble 5	55.8 om com Nov 119.19	60.43 munity h		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213	see Table sable 5), Wareb Marulated in Ara 13.6 calculated in 2 207.68	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93	48.07 only if c): May 119.19 L, equati 7.7 dix L, equali	Jun 119.19 ion L9 of 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1:	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93	55.8 om com Nov 119.19	60.43 munity h		(66)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc	see Table sable 5), Wabb Mar 19 119.19 ulated in A 13.6 calculated in A 207.68 culated in A	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix	48.07 only if c): May 119.19 L, equati 7.7 dix L, equati 181.11 L, equat	Jun 119.19 ion L9 o 6.5 uation L 167.17	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a)	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93	55.8 om com Nov 119.19 18.16	60.43 munity h		(66) (67) (68)
(65)m= 61.99 54. include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34.	table 5), Wa have been mare to the see Table shall be 5), Wa have been mare to the see Table shall be a see Table	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92	48.07 only if c): May 119.19 L, equati 7.7 dix L, equali	Jun 119.19 ion L9 of 6.5 uation L	Jul 119.19 r L9a), a 7.02 13 or L1:	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93	55.8 om com Nov 119.19	60.43 munity h		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains	to the second se	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a)	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16	Dec 119.19 19.36 201.7		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 3	to the second se	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a)	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93	55.8 om com Nov 119.19 18.16	Dec 119.19 19.36		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (cale (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evaporations	see Table sable 5), Wareb Mar 119.119.119.113.6 calculated in A 13.6 calculated in A 2 2 207.68 culated in A 2 34.92 dins (Table 3 3 34.92).115	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93 ppendix 34.92 5a) 3 ttive value	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5)	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95	see Table sable 5), Wareb Mar 119.119.119.113.6 calculated in A 13.6 calculated in A 2 2 207.68 culated in A 3 34.92 sins (Table 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16	Dec 119.19 19.36 201.7		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains	see Table sable 5), Waseb Mar 19 119.19 sulated in A 13.6 calculated in A 20 34.92 sins (Table 3 35 -95.35 s (Table 5)	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 o 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	Jul 119.19 r L9a), a 7.02 13 or L1 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92 3	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92 3	55.8 om com Nov 119.19 18.16 187.76 34.92 3	60.43 munity h Dec 119.19 19.36 201.7 34.92 3		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95	see Table sable 5), Waseb Mar 19 119.19 sulated in A 13.6 calculated in A 20 34.92 sins (Table 3 35 -95.35 s (Table 5)	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Appendix 195.93 ppendix 34.92 5a) 3 ttive value	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5)	Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67 , also se 34.92	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92	52.04 ater is fr Oct 119.19 15.56 ole 5 172.93 5 34.92	55.8 om com Nov 119.19 18.16 187.76 34.92	Dec 119.19 19.36 201.7		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (calc (67)m= 18.83 16. Appliances gains ((68)m= 211.01 213 Cooking gains (calc (69)m= 34.92 34. Pumps and fans gains (70)m= 3 33 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains	see Table sable 5), Wareb Mar 119.119.119.119.113.6 ralculated in Ar 22.207.68 ration (negation	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	40.15 s in the c Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92 3 -95.35	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92 3 -95.35	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	55.8 om com Nov 119.19 18.16 187.76 34.92 3 -95.35	60.43 munity h Dec 119.19 19.36 201.7 34.92 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.19 119 Lighting gains (cale (67)m= 18.83 16. Appliances gains (68)m= 211.01 213 Cooking gains (cale (69)m= 34.92 34. Pumps and fans gains (70)m= 3 3 Losses e.g. evapor (71)m= -95.35 -95 Water heating gains (72)m= 83.31 80.	56.26	49.73 of (65)m 5 and 5a tts Apr 119.19 ppendix 10.3 n Append 195.93 ppendix 34.92 5a) 3 tive valu -95.35	48.07 only if c): May 119.19 L, equati 7.7 dix L, equ 181.11 L, equat 34.92 3 es) (Tab	Jun 119.19 ion L9 of 6.5 uation L 167.17 ion L15 34.92 3 le 5) -95.35	40.15 s in the c Jul 119.19 r L9a), a 7.02 13 or L1: 157.86 or L15a) 34.92 3 -95.35	45 dwelling Aug 119.19 lso see 9.13 3a), also 155.67), also se 34.92 3 -95.35	45.5 or hot w Sep 119.19 Table 5 12.25 o see Tal 161.19 ee Table 34.92 3 -95.35	52.04 ater is fr Oct 119.19 15.56 ble 5 172.93 5 34.92 3 -95.35	55.8 om com Nov 119.19 18.16 187.76 34.92 3 -95.35	60.43 munity h Dec 119.19 19.36 201.7 34.92 3 -95.35		(66) (67) (68) (69) (70)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9	0.77	X	2.6	x	11.28	x	0.63	x	0.7] =	17.93	(75)
Northeast 0.9	0.77	X	3.15	x	11.28	x	0.63	x	0.7	=	21.72	(75)
Northeast 0.9	0.77	X	2.6	х	22.97	x	0.63	x	0.7	=	36.5	(75)
Northeast 0.9	0.77	X	3.15	x	22.97	x	0.63	x	0.7] =	44.22	(75)
Northeast 0.9	0.77	x	2.6	x	41.38	x	0.63	x	0.7] =	65.76	(75)
Northeast 0.9	0.77	X	3.15	х	41.38	x	0.63	x	0.7	=	79.67	(75)
Northeast 0.9	0.77	X	2.6	х	67.96	x	0.63	x	0.7	=	107.99	(75)
Northeast 0.9	0.77	X	3.15	x	67.96	x	0.63	X	0.7	=	130.84	(75)
Northeast 0.9	0.77	X	2.6	х	91.35	x	0.63	x	0.7	=	145.17	(75)
Northeast 0.9	0.77	X	3.15	x	91.35	x	0.63	x	0.7	=	175.87	(75)
Northeast 0.9	0.77	X	2.6	x	97.38	x	0.63	x	0.7	=	154.76	(75)
Northeast 0.9	0.77	X	3.15	x	97.38	x	0.63	X	0.7	=	187.5	(75)
Northeast 0.9	0.77	X	2.6	х	91.1	x	0.63	x	0.7	=	144.78	(75)
Northeast 0.9	0.77	X	3.15	х	91.1	x	0.63	x	0.7	=	175.4	(75)
Northeast 0.9	0.77	x	2.6	x	72.63	x	0.63	x	0.7] =	115.42	(75)
Northeast 0.9	0.77	X	3.15	x	72.63	x	0.63	x	0.7	=	139.83	(75)
Northeast 0.9	0.77	X	2.6	х	50.42	x	0.63	x	0.7	=	80.13	(75)
Northeast 0.9	0.77	x	3.15	x	50.42	x	0.63	x	0.7] =	97.08	(75)
Northeast 0.9	0.77	X	2.6	x	28.07	x	0.63	x	0.7	=	44.6	(75)
Northeast 0.9	0.77	x	3.15	x	28.07	x	0.63	x	0.7] =	54.04	(75)
Northeast 0.9	0.77	x	2.6	x	14.2	x	0.63	x	0.7] =	22.56	(75)
Northeast 0.9	0.77	X	3.15	x	14.2	x	0.63	x	0.7] =	27.33	(75)
Northeast 0.9	0.77	X	2.6	x	9.21	x	0.63	x	0.7	=	14.64	(75)
Northeast 0.9	0.77	x	3.15	x	9.21	x	0.63	x	0.7] =	17.74	(75)
Southwest _{0.9}	0.77	X	4.39	х	36.79		0.63	x	0.7	=	49.36	(79)
Southwest _{0.9}	0.77	X	0.52	x	36.79		0.63	x	0.7	=	5.85	(79)
Southwest _{0.9}	0.77	X	4.39	x	62.67		0.63	X	0.7	=	84.09	(79)
Southwest _{0.9}	0.77	X	0.52	x	62.67		0.63	x	0.7	=	9.96	(79)
Southwest _{0.9}	0.77	x	4.39	x	85.75		0.63	x	0.7	=	115.05	(79)
Southwest _{0.9}	0.77	X	0.52	x	85.75		0.63	x	0.7	=	13.63	(79)
Southwest _{0.9}	0.77	X	4.39	x	106.25		0.63	x	0.7	=	142.55	(79)
Southwest _{0.9}	0.77	X	0.52	x	106.25		0.63	x	0.7	=	16.89	(79)
Southwest _{0.9}	0.77	X	4.39	х	119.01		0.63	x	0.7	=	159.67	(79)
Southwest _{0.9}	0.77	X	0.52	х	119.01		0.63	x	0.7	=	18.91	(79)
Southwest _{0.9}	0.77	X	4.39	x	118.15		0.63	x	0.7] =	158.51	(79)
Southwest _{0.9}	0.77	X	0.52	x	118.15		0.63	x	0.7] =	18.78	(79)
Southwest _{0.9}	0.77	X	4.39	x	113.91		0.63	x	0.7] =	152.83	(79)
Southwest _{0.9}	0.77	X	0.52	x	113.91		0.63	x	0.7] =	18.1	(79)
Southwest _{0.9}	0.77	X	4.39	x	104.39		0.63	x	0.7] =	140.05	(79)

																_
Southwest _{0.9}	0.77	×	0.5	52	X	10	04.39			0.63	x	0.7		=	16.59	(79)
Southwest _{0.9}	0.77	x	4.3	39	X	9	2.85			0.63	x	0.7		=	124.57	(79)
Southwest _{0.9}	0.77	x	0.5	52	X	9	2.85]		0.63	x [0.7		=	14.76	(79)
Southwest _{0.9}	0.77	X	4.3	39	X	6	9.27]		0.63	x [0.7		=	92.93	(79)
Southwest _{0.9}	0.77	X	0.5	52	x	6	9.27]		0.63	x [0.7		=	11.01	(79)
Southwest _{0.9}	0.77	X	4.3	39	X	4	4.07]		0.63	x [0.7		=	59.13	(79)
Southwesto.	0.77	X	0.5	52	x	4	4.07]		0.63	x [0.7		=	7	(79)
Southwest _{0.9}	0.77	X	4.3	39	x	3	1.49]		0.63	x [0.7		=	42.25	(79)
Southwest _{0.9}	0.77	X	0.5	52	x	3	1.49			0.63	x	0.7		=	5	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 94.8	7 174.76	274.1	398.27	499.62	51	19.55	491.11	411.	.89	316.54	202.58	116.03	79.6	3		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts									
(84)m= 469.	78 547.04	632.76	735.33	814.79	81	13.55	771.71	698	.94	614.94	522.79	461.2	443.6	67		(84)
7. Mean in	ternal temp	perature	(heating	season)											
Temperatu	re during h	neating p	eriods ir	n the livii	ng a	area f	from Tab	ole 9,	, Th	1 (°C)					21	(85)
Utilisation	factor for g	ains for l	living are	ea, h1,m	(Se	ee Ta	ble 9a)			, ,						
Ja	<u> </u>	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	De	c		
(86)m= 1	0.99	0.99	0.95	0.86		0.7	0.54	0.6	61	0.86	0.98	1	1			(86)
Mean inter	nal temner	ature in	living ar	-a T1 (fo	الم	w ste	ns 3 to 7	7 in T	ahle	2 9c)		-				
(87)m= 19.5		20.03	20.42	20.75	_	0.93	20.98	20.9		20.82	20.39	19.91	19.5	4		(87)
` ′		ı		l			l									` ,
Temperatu (88)m= 19.8		19.84	19.85	19.85	_	9.86	19.86	19.8		12 (°C) 19.86	19.85	19.85	19.8	4		(88)
(88)m= 19.8	19.04	19.04	19.00	19.00	'	9.00	19.00	19.0	00	19.00	19.00	19.05	19.0	4		(00)
Utilisation	 	1		welling,			i	9a)				,				
(89)m= 1	0.99	0.98	0.94	0.81		0.6	0.41	0.4	17	0.78	0.96	0.99	1			(89)
Mean inter	nal temper	ature in	the rest	of dwelli	ing	T2 (fo	ollow ste	eps 3	to 7	in Tabl	e 9c)					
(90)m= 17.9	5 18.19	18.61	19.17	19.61	1	9.82	19.85	19.8	85	19.72	19.14	18.45	17.9	1		(90)
		-								f	LA = Liv	ng area ÷ (4	4) =		0.26	(91)
Mean inter	nal temper	ature (fo	r the wh	ole dwe	llind	a) = fl	LA x T1	+ (1	– fL	A) x T2				•		_
(92)m= 18.3		18.97	19.49	19.9	_	20.1	20.14	20.		20	19.46	18.82	18.3	2		(92)
Apply adju	stment to t	he mear	interna	l temper	ı atu	re fro	m Table	4e,	<u> </u>	re appro	priate	<u> </u>	<u> </u>			
(93)m= 18.3	<u> </u>	18.97	19.49	19.9	_	20.1	20.14	20.	$\overline{}$	20	19.46	18.82	18.3	2		(93)
8. Space h	eating req	uirement														
Set Ti to th	e mean in	ternal ter	nperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-c	alc	ulate	
the utilisati	on factor fo	or gains	using Ta	ble 9a			·					1	,			
Ja		Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	De	C		
Utilisation					_			_								
(94)m= 1	0.99	0.98	0.93	0.82	(0.62	0.44	0.5	51	0.79	0.96	0.99	1			(94)
Useful gair		· `	<u> </u>		T							T				(05)
(95)m= 467.		617.72	683.83	664.23	<u> </u>	05.26	339.32	353.	./1	487.53	501.26	457.01	442.0)5		(95)
Monthly av		1	i –	1	_		16.0	10	<u>, I</u>	111	10.0	7.4	4.0			(96)
(96)m= 4.3		6.5	8.9	11.7		14.6	16.6	16.		14.1	10.6	7.1	4.2			(30)
Heat loss (97)m= 1396	ate for me			r	_	, VV = 34.14	=[(39)m : 343.89	x [(93	_ т	- (96)m 574.39	867.24	1151.19	1202	32		(97)
(37)111= 1390	1330.75	1204.12	1030.10	002.70		JT. 14	J+J.08	302	.23	514.38	007.24	1 131.19	1382.	JJ		(31)

Space heating requi	1	1	T .	ı	ı		<u> </u>	ŕ	·			
(98)m= 691.44 547.66	458.6	255.12	103.08	0	0	O Tota	0 I per year	272.29	499.81	707.01	2525	(98)
Chan booting roqui	omant in	. Id\A/b/po3	2hroor			Tota	i per year	(KWII/yeai	i) = Sum(9	O) _{15,912} =	3535	╡``
Space heating requi)			L	46.48	(99)
9a. Energy requireme Space heating:	nts – Ind	ividual h	eating sy	ystems ı	ncluding	micro-C	HP)					
Fraction of space he	at from s	econdar	y/supple	mentary	system					ſ	0	(201)
Fraction of space he	at from n	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of total heat	ing from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =		Ī	1	(204)
Efficiency of main sp	ace heat	ing syste	em 1								93.4	(206)
Efficiency of second	ary/suppl	ementar	y heating	g systen	າ, %						0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	- ear
Space heating requi	- 			i	1							
691.44 547.66	458.6	255.12	103.08	0	0	0	0	272.29	499.81	707.01		
(211) m = {[(98)m x (2)]	T					Ι ,		204 52	F25 42	756.07		(211)
740.3 586.36	491.01	273.15	110.37	0	0	0 Tota	0 I (kWh/yea	291.53 ar) =Sum(2	535.13	756.97	3784.8	(211)
Space heating fuel (= {[(98)m x (201)] } x 215)m= 0 0		- /	month o	0	0	0	0	0	0	0		_
<u> </u>	1	ļ .	ļ.			Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u></u>	0	(215
Water heating										L		
Output from water he	ater (calc	ulated a	bove) 155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
Efficiency of water he	1	100.40	100.00	130.02	131.09	140.13	147.73	100.24	179.59	194.50	80.3	(216)
217)m= 87.93 87.74	87.29	86.21	84.05	80.3	80.3	80.3	80.3	86.26	87.49	88.01		(217)
Fuel for water heating (219)m = (64)m x 10	•											
219)m= 226.38 198.17	207.24	186.12	184.84	170.39	163.25	181.98	183.99	195.04	205.27	220.85		_
						Tota	I = Sum(2				2323.54	(219)
Annual totals Space heating fuel us	ed main	system	1					k'	Wh/yeaı	r T	kWh/yea 3784.8	<u>r</u>
Nater heating fuel us		System	•							L T	2323.54	╡
Electricity for pumps,		alaatria	kaan ha	4						Ĺ	2323.34	
		CICCUIC	кеер-по	ı								(000
central heating pump										30		(230
boiler with a fan-ass										45		(230
Total electricity for the	above, l	kWh/yea	ır			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting											332.6	(232)
12a. CO2 emissions	– Individ	ual heat	ing syste	ems inclu	uding mi	cro-CHF)					

Energy

kWh/year

Stroma FSAP 2012 Version: 1.0.4.10 (SAP 9.92) - http://www.stroma.com

Emissions

kg CO2/year

Emission factor

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216 =	817.52 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	501.88 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1319.4 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	172.62 (268)
Total CO2, kg/year	sum	of (265)(271) =	1530.94 (272)

TER = 20.13 (273)

		l lsar I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 4-	1-Lean				
Address: 1. Overall dwelling dime	anciona:								
1. Overall dwelling diffie	ensions.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	54.34	(4)			_		
Dwelling volume				I (3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	141.28	(5)
2. Ventilation rate:									
2. Ventuation rate.	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	Ī + Ē	0	-	0	x	20 =	0	(6b)
Number of intermittent fa	ins				2	x .	10 =	20	(7a)
Number of passive vents	;				0	x .	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
				<u>L</u>					
				_			Air ch	nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(peen carried out or is intended, proceed			continue f	20		÷ (5) =	0.14	(8)
Number of storeys in the		id to (11),	ound wide	oonanao n	0111 (0) 10	(10)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
ir both types of wall are p deducting areas of openii	resent, use the value corresponding t ngs); if equal user 0.35	o tne grea	ter wall are	ea (arter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	P x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15)
	q50, expressed in cubic metre	es per h					area	5	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)		·		0.39	(18)
	es if a pressurisation test has been do	ne or a de	egree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (²	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18		,-			0.33	(21)
Infiltration rate modified f	•							0.00	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
	• •			_	_			-	

Adjusted infiltra	ation rate (allo	wing for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.42	0.42 0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39		
Calculate effec	_	e rate for t	he appli	cable ca	se	!	!	!	<u>I</u>	<u>!</u>		
If mechanica		on and by NL (O	Ol-) (OO-		(()	MEN - de -) (00-)			0	(23a)
	eat pump using Ap							= (23a)			0	(23b)
	heat recovery: e		_								0	(23c)
	d mechanical			i	- 	- ´ ` -	í `	 	 	- ` ´	÷ 100] I	(0.4-)
(24a)m= 0	0 0	0	0	. 0	0	0	0	0	0	0		(24a)
· -	d mechanical			ı	 	- ^ ` ` - 	í `	r Ó - Ò	- 	<u> </u>	İ	(0.45)
(24b)m= 0	0 0	0	0		0	0	0	0	0	0		(24b)
,	ouse extract v n < 0.5 x (23b)		•	•				E v (22h	.\			
(24c)m = 0	0 0.5 x (230)	0) = (23L 0	0	0	$C_0 = (22)$	0	0	0	0	1	(24c)
` ′	ventilation or v											(= : -)
,	n = 1, then (24							0.5]				
(24d)m= 0.59	0.59 0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58		(24d)
Effective air	change rate -	enter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)				•	
(25)m= 0.59	0.59 0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58		(25)
3. Heat losses	s and heat los	s paramete	ët.			•	•					
ELEMENT	Gross	Openin m	gs	Net Ar		U-val W/m2		AXU	()	k-value		A X k kJ/K
Doors	area (m²)	11	ı~	A ,r				(W/I	<u>^)</u>	KJ/III~·I	`	
	. 1			2.6	X	<u> </u>	0.041	2.6	릠			(26)
Windows Type				4.56				6.05	=			(27)
Windows Type				1.4		/[1/(1.4)+		1.86				(27)
Windows Type				0.48	=	/[1/(1.4)+	0.04] =	0.64	ᆗ ,			(27)
Walls Type1	59.86	11	_	48.86	_	0.18	=	8.79	닠 !		╛╘	(29)
Walls Type2	24.47	2.6		21.87	7 X	0.18	=	3.94	_		╛	(29)
Walls Type3	2.57	0		2.57	X	0.18	=	0.46	[<u> </u>	(29)
Roof	54.34	0		54.34	1 X	0.13	=	7.06				(30)
Total area of e	lements, m ²			141.2	4							(31)
Party wall				7.81	X	0		0				(32)
Party floor				54.34	1							(32a)
* for windows and ** include the area					lated using	g formula 1	l/[(1/U-valu	ıe)+0.04] a	ns given in	paragrapl	3.2	
Fabric heat los	s, W/K = S (A	x U)				(26)(30) + (32) =				37.44	(33)
Heat capacity (Cm = S(A x k)					((28).	(30) + (32	2) + (32a).	(32e) =	18919.4	16 (34)
Thermal mass	parameter (Ti	MP = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	Medium		250	(35)
For design assess can be used instea			constructi	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) c	alculated (using Ap	pendix l	K						25.93	(36)
if details of therma	l bridging are not	known (36) =	= 0.15 x (3	1)								
Total fabric hea	at loss						(33) +	(36) =			63.37	(37)

Ventila	ition hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)	1		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.51	27.35	27.19	26.44	26.3	25.64	25.64	25.52	25.89	26.3	26.58	26.88		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	90.88	90.71	90.55	89.8	89.66	89.01	89.01	88.89	89.26	89.66	89.95	90.24		
Heat lo	oss para	meter (H	HLP), W	m²K				-		Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	89.8	(39)
(40)m=	1.67	1.67	1.67	1.65	1.65	1.64	1.64	1.64	1.64	1.65	1.66	1.66		
Numbe	er of day	s in moi	nth (Tab	le 1a)			•	•		Average =	Sum(40) ₁	12 /12=	1.65	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
•			•				•	•	•		•			
4. Wa	iter heat	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assum	ed occi	ıpancy, l	N									00		(42)
if TF.		9, N = 1	+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		82		(42)
		,	ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		77	'.38		(43)
		•	hot water person per	• •		-	-	to achieve	a water u	se target o	f			
1101 111010								T .			T			
Hot water	Jan er usage ii	Feb	Mar day for ea	Apr	May $Vd m = fa$	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
ı	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.00	78.92	82.02	85.12		
(44)m=	65.12	62.02	76.92	75.63	12.13	09.04	09.04	12.13	75.83		m(44) ₁₁₂ =	l	928.53	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600					920.33	(/
(45)m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1217.45	(45)
(46)m=	18.93	16.56	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		(46)
	storage						•		•					
ŭ		` ,	includir				ŭ		ame ves	sel		0		(47)
Otherw	vise if no	stored	nd no ta		_			. ,	ers) ente	er '0' in (47)			
	storage nanufact		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
,			m Table			,	• ,					0		(49)
•			· storage		ear			(48) x (49) =			0		(50)
b) If m	anufact	urer's de	eclared o	cylinder l	oss fact									,
		_	factor fr		e 2 (kW	h/litre/da	ay)					0		(51)
	-	leating s from Ta	ee secti	on 4.3										(50)
			m Table	2h								0		(52) (53)
•			storage		ear			(47) x (51) x (52) v (53) -				, ,
• • • • • • • • • • • • • • • • • • • •		(54) in (5	_	, KVVII/ yt	Jai			(TI) X (31	, ^ (JZ) ^ (<i>-</i>	-	0		(54) (55)
	. ,	. , .	culated t	for each	month			((56)m = (55) × (41)	m		~		(33)
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
(00)111-		L	<u> </u>	L	L		<u> </u>	L Č	L Č	<u> </u>	L Č	L		(50)

,	tains dedicate	d solar sto	rage, (57)i	111 = (30)111	x [(30) – (/] . (0), 0.00 (0	7)111 – (30)	m where (1111) 13 110	m Append	IX IT	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary cire	cuit loss (ar	nual) fro	m Table	 - 3							0		(58)
Primary cire	,	,			59)m = ((58) ÷ 36	65 × (41)	m				'	
(modified	by factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss	calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 43.3	37.75	40.22	37.4	37.06	34.34	35.49	37.06	37.4	40.22	40.45	43.37		(61)
Total heat i	equired for	water he	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 169	.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		(62)
Solar DHW in	out calculated	using App	endix G oı	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add addition	onal lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output fron	n water hea	iter											
(64)m= 169	.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		_
							Outp	out from wa	ater heate	r (annual)₁	12	1681.59	(64)
Heat gains	from water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 52.8	31 46.14	47.93	42.37	40.95	35.93	34.21	38.34	38.77	44.34	47.54	51.49		(65)
include (57)m in cal	culation of	of (65)m	only if c	ylinder is	s in the	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Interna	l gains (see	e Table 5	and 5a):									
Metabolic g	ains (Table	e 5). Wat	ts										
Ja													
	n Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 90.	-	Mar 90.9		May 90.9	Jun 90.9	Jul 90.9	Aug 90.9	Sep 90.9	Oct 90.9	Nov 90.9	Dec 90.9		(66)
	9 90.9	90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		_			(66)
(66)m= 90.	9 90.9 ins (calcula	90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		_			(66) (67)
(66)m= 90. Lighting ga	9 90.9 ins (calcula 21 12.62	90.9 ted in Ap 10.27	Apr 90.9 opendix 7.77	90.9 L, equat 5.81	90.9 ion L9 oi 4.9	90.9 r L9a), a 5.3	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		, ,
(66)m= 90. Lighting ga (67)m= 14.	9 90.9 ins (calcula 21 12.62 gains (calc	90.9 ted in Ap 10.27	Apr 90.9 opendix 7.77	90.9 L, equat 5.81	90.9 ion L9 oi 4.9	90.9 r L9a), a 5.3	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		, ,
(66)m= 90. Lighting ga (67)m= 14. Appliances	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13	90.9 ted in Ap 10.27 culated in	Apr 90.9 ppendix 7.77 Append 147.16	90.9 L, equat 5.81 dix L, eq 136.02	90.9 ion L9 or 4.9 uation L	90.9 r L9a), a 5.3 13 or L1 118.56	90.9 Iso see 6.89 3a), also	90.9 Table 5 9.25 see Tal	90.9 11.74 ble 5 129.89	90.9	90.9		(67)
(66)m= 90. Lighting ga (67)m= 14. Appliances (68)m= 158	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula	90.9 ted in Ap 10.27 culated in	Apr 90.9 ppendix 7.77 Append 147.16	90.9 L, equat 5.81 dix L, eq 136.02	90.9 ion L9 or 4.9 uation L	90.9 r L9a), a 5.3 13 or L1 118.56	90.9 Iso see 6.89 3a), also	90.9 Table 5 9.25 see Tal	90.9 11.74 ble 5 129.89	90.9	90.9		(67)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09	Apr 90.9 opendix 7.77 Append 147.16 opendix 32.09	90.9 L, equat 5.81 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.9 uation L 125.56 tion L15	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a)	90.9 lso see 6.89 3a), also 116.92	90.9 Table 5 9.25 9 see Tal 121.06 ee Table	90.9 11.74 ble 5 129.89 5	90.9	90.9		(67) (68)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09	Apr 90.9 opendix 7.77 Append 147.16 opendix 32.09	90.9 L, equat 5.81 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.9 uation L 125.56 tion L15	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a)	90.9 lso see 6.89 3a), also 116.92	90.9 Table 5 9.25 9 see Tal 121.06 ee Table	90.9 11.74 ble 5 129.89 5	90.9	90.9		(67) (68)
(66)m= 90. Lighting ga (67)m= 14. Appliances (68)m= 158 Cooking ga (69)m= 32.6 Pumps and	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a)	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.9 uation L 125.56 tion L15 32.09	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.89 3a), also 116.92), also se 32.09	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09	90.9 11.74 ble 5 129.89 5 32.09	90.9 13.7 141.02 32.09	90.9 14.61 151.49 32.09		(67) (68) (69)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.: Pumps and (70)m= 3	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporation	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a)	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.9 uation L 125.56 tion L15 32.09	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.89 3a), also 116.92), also se 32.09	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09	90.9 11.74 ble 5 129.89 5 32.09	90.9 13.7 141.02 32.09	90.9 14.61 151.49 32.09		(67) (68) (69)
(66)m= 90. Lighting ga (67)m= 14 Appliances (68)m= 158 Cooking ga (69)m= 32 Pumps and (70)m= 3 Losses e.g (71)m= -72.	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporatio 72 -72.72	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negation of the second o	Apr 90.9 ppendix 7.77 Appendix 147.16 ppendix 32.09 5a) 3	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab	90.9 ion L9 or 4.9 uation L 125.56 ion L15 32.09 3 ole 5)	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.89 3a), also 116.92 , also se 32.09	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09	90.9 11.74 ble 5 129.89 5 32.09	90.9 13.7 141.02 32.09	90.9 14.61 151.49 32.09		(67) (68) (69) (70)
(66)m= 90. Lighting ga (67)m= 14. Appliances (68)m= 158 Cooking ga (69)m= 32. Pumps and (70)m= 3 Losses e.g	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 9 32.09 fans gains 3 evaporatic 72 -72.72 ing gains (7	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negation of the second o	Apr 90.9 ppendix 7.77 Appendix 147.16 ppendix 32.09 5a) 3	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab	90.9 ion L9 or 4.9 uation L 125.56 ion L15 32.09 3 ole 5)	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.89 3a), also 116.92 , also se 32.09	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09	90.9 11.74 ble 5 129.89 5 32.09	90.9 13.7 141.02 32.09	90.9 14.61 151.49 32.09		(67) (68) (69) (70)
(66)m= 90. Lighting ga (67)m= 14. Appliances (68)m= 158 Cooking ga (69)m= 32. Pumps and (70)m= 3 Losses e.g (71)m= -72. Water heat (72)m= 70.9	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporatio 72 -72.72 ing gains (7 98 68.67	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negation of the color of the colo	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a) 3 tive valu	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab	90.9 ion L9 or 4.9 uation L 125.56 tion L15 32.09 3 ble 5) -72.72	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09 3 -72.72	90.9 so see	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09 3	90.9 11.74 ble 5 129.89 5 32.09 3 -72.72	90.9 13.7 141.02 32.09 3 -72.72	90.9 14.61 151.49 32.09 3 -72.72		(67) (68) (69) (70)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.: Pumps and (70)m= 3 Losses e.g (71)m= -72. Water heat	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 I fans gains 3 . evaporatio 72 -72.72 ing gains (1 98 68.67 nal gains =	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negation of the color of the colo	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a) 3 tive valu	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab	90.9 ion L9 or 4.9 uation L 125.56 tion L15 32.09 3 ble 5) -72.72	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09 3 -72.72	90.9 so see	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09 3 -72.72	90.9 11.74 ble 5 129.89 5 32.09 3 -72.72	90.9 13.7 141.02 32.09 3 -72.72	90.9 14.61 151.49 32.09 3 -72.72		(67) (68) (69) (70)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.: Pumps and (70)m= 3 Losses e.g (71)m= -72.: Water heat (72)m= 70.: Total internal	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporatio 72 -72.72 ing gains (7 98 68.67 nal gains = 95 294.69	90.9 ted in Ap 10.27 culated in 155.98 ated in A 32.09 (Table 5 3 on (negation of the color) 72.72 Table 5) 64.43	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a) 3 tive valu -72.72	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab -72.72	90.9 ion L9 of 4.9 uation L 125.56 tion L15 32.09 3 ole 5) -72.72 49.9 (66)	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09 3 -72.72 45.98 m + (67)m	90.9 lso see 6.89 3a), also 116.92), also se 32.09 3 -72.72 51.53 1+(68)m+	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09 3 -72.72 53.85 + (69)m + (90.9 11.74 ble 5 129.89 5 32.09 3 -72.72 59.6 (70)m + (7	90.9 13.7 141.02 32.09 3 -72.72 66.03 1)m + (72)	90.9 14.61 151.49 32.09 3 -72.72 69.2		(67) (68) (69) (70) (71)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.: Pumps and (70)m= 3 Losses e.g (71)m= -72.: Water heat (72)m= 70.: Total inter (73)m= 296 6. Solar ga	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporatio 72 -72.72 ing gains (7 98 68.67 nal gains = 95 294.69	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negation of the color of the colo	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a) 3 tive valu -72.72 58.85	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab -72.72 55.04	90.9 ion L9 or 4.9 uation L 125.56 tion L15 32.09 3 ole 5) -72.72 49.9 (66) 233.63	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09 3 -72.72 45.98 m + (67)m 223.11	90.9 so see	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09 3 -72.72 53.85 + (69)m + (237.43	90.9 11.74 ble 5 129.89 5 32.09 3 -72.72 59.6 (70)m + (7 254.5	90.9 13.7 141.02 32.09 3 -72.72 66.03 1)m + (72) 274.02	90.9 14.61 151.49 32.09 3 -72.72 69.2		(67) (68) (69) (70) (71)
(66)m= 90. Lighting ga (67)m= 14.: Appliances (68)m= 158 Cooking ga (69)m= 32.: Pumps and (70)m= 3 Losses e.g (71)m= -72.: Water heat (72)m= 70.: Total inter (73)m= 296 6. Solar ga	9 90.9 ins (calcula 21 12.62 gains (calcula 48 160.13 ins (calcula 09 32.09 fans gains 3 evaporatio 72 -72.72 ing gains (7 98 68.67 nal gains = 95 294.69 ains: are calculated	90.9 ted in Ap 10.27 culated in 155.98 ated in Ap 32.09 (Table 5 3 on (negat -72.72 Table 5) 64.43 cusing sola cactor	Apr 90.9 ppendix 7.77 Append 147.16 ppendix 32.09 5a) 3 tive valu -72.72 58.85	90.9 L, equat 5.81 dix L, eq 136.02 L, equat 32.09 3 es) (Tab -72.72 55.04	90.9 ion L9 or 4.9 uation L 125.56 tion L15 32.09 3 ole 5) -72.72 49.9 (66) 233.63 and associ	90.9 r L9a), a 5.3 13 or L1 118.56 or L15a) 32.09 3 -72.72 45.98 m + (67)m 223.11	90.9 Iso see 6.89 3a), also 116.92 1, also se 32.09 3 -72.72 51.53 1+ (68)m + 228.61	90.9 Table 5 9.25 see Tal 121.06 ee Table 32.09 3 -72.72 53.85 + (69)m + (237.43	90.9 11.74 ble 5 129.89 5 32.09 3 -72.72 59.6 70)m + (7 254.5 e applicate	90.9 13.7 141.02 32.09 3 -72.72 66.03 1)m + (72) 274.02	90.9 14.61 151.49 32.09 3 -72.72 69.2	Gains (W)	(67) (68) (69) (70) (71)

	Northeast 0.9x 0.77 x 4.56 x 11.28 x 0.63 x 0.7 = 31.45 (75)											
_	0.77	X	4.56	X	11.28	X	0.63	X	0.7	=	31.45	(75)
Northeast _{0.9x}	0.77	X	4.56	X	22.97	X	0.63	X	0.7	=	64.01	(75)
Northeast _{0.9x}	0.77	X	4.56	X	41.38	X	0.63	X	0.7	=	115.33	(75)
Northeast _{0.9x}	0.77	X	4.56	X	67.96	X	0.63	X	0.7	=	189.41	(75)
Northeast _{0.9x}	0.77	X	4.56	X	91.35	X	0.63	X	0.7	=	254.6	(75)
Northeast _{0.9x}	0.77	X	4.56	X	97.38	X	0.63	X	0.7	=	271.43	(75)
Northeast 0.9x	0.77	X	4.56	x	91.1	X	0.63	X	0.7	=	253.92	(75)
Northeast _{0.9x}	0.77	X	4.56	x	72.63	x	0.63	X	0.7	=	202.43	(75)
Northeast _{0.9x}	0.77	X	4.56	x	50.42	X	0.63	X	0.7	=	140.53	(75)
Northeast 0.9x	0.77	x	4.56	x	28.07	x	0.63	X	0.7	=	78.23	(75)
Northeast _{0.9x}	0.77	x	4.56	x	14.2	x	0.63	X	0.7	=	39.57	(75)
Northeast _{0.9x}	0.77	X	4.56	x	9.21	X	0.63	X	0.7	=	25.68	(75)
Southwest _{0.9x}	0.77	X	1.4	x	36.79]	0.63	X	0.7	=	15.74	(79)
Southwest _{0.9x}	0.77	x	0.48	x	36.79]	0.63	X	0.7	=	5.4	(79)
Southwest _{0.9x}	0.77	X	1.4	x	62.67]	0.63	X	0.7	=	26.82	(79)
Southwest _{0.9x}	0.77	x	0.48	x	62.67]	0.63	X	0.7	=	9.19	(79)
Southwest _{0.9x}	0.77	x	1.4	x	85.75]	0.63	X	0.7	=	36.69	(79)
Southwest _{0.9x}	0.77	X	0.48	x	85.75]	0.63	X	0.7	=	12.58	(79)
Southwest _{0.9x}	0.77	x	1.4	x	106.25]	0.63	X	0.7	=	45.46	(79)
Southwest _{0.9x}	0.77	x	0.48	x	106.25]	0.63	X	0.7	=	15.59	(79)
Southwest _{0.9x}	0.77	x	1.4	x	119.01]	0.63	X	0.7	=	50.92	(79)
Southwest _{0.9x}	0.77	x	0.48	x	119.01]	0.63	X	0.7	=	17.46	(79)
Southwest _{0.9x}	0.77	x	1.4	x	118.15]	0.63	x	0.7	=	50.55	(79)
Southwest _{0.9x}	0.77	x	0.48	x	118.15]	0.63	X	0.7	=	17.33	(79)
Southwest _{0.9x}	0.77	x	1.4	x	113.91]	0.63	x	0.7	=	48.74	(79)
Southwest _{0.9x}	0.77	x	0.48	x	113.91]	0.63	x	0.7	=	16.71	(79)
Southwest _{0.9x}	0.77	X	1.4	x	104.39]	0.63	X	0.7	=	44.66	(79)
Southwest _{0.9x}	0.77	x	0.48	x	104.39]	0.63	X	0.7	=	15.31	(79)
Southwest _{0.9x}	0.77	X	1.4	x	92.85]	0.63	X	0.7	=	39.73	(79)
Southwest _{0.9x}	0.77	X	0.48	x	92.85]	0.63	X	0.7	=	13.62	(79)
Southwest _{0.9x}	0.77	x	1.4	x	69.27]	0.63	X	0.7	=	29.64	(79)
Southwest _{0.9x}	0.77	X	0.48	x	69.27]	0.63	X	0.7	=	10.16	(79)
Southwest _{0.9x}	0.77	X	1.4	x	44.07]	0.63	X	0.7	=	18.86	(79)
Southwest _{0.9x}	0.77	x	0.48	x	44.07]	0.63	X	0.7	=	6.46	(79)
Southwest _{0.9x}	0.77	X	1.4	x	31.49]	0.63	X	0.7	=	13.47	(79)
Southwest _{0.9x}	0.77	X	0.48	x	31.49]	0.63	X	0.7	=	4.62	(79)
Solar gains in v					i	Ė	n = Sum(74)m.				1	
(83)m= 52.59		4.6	250.45 322.9		39.31 319.36	262	2.4 193.88	118.03	64.89	43.77		(83)
Total gains – in		_	` 	`	· ·	104	04 404 04	070.50	1 000 04	000.04	1	(0.4)
(84)m= 349.54		3.54	517.5 573.12		72.94 542.48	491	.01 431.31	372.52	2 338.91	332.34	l	(84)
7. Mean interr		•										
Temperature	•	•		•		ole 9	, Th1 (°C)				21	(85)
Utilisation fact	<u>_</u>	$\overline{}$	 	Ť				_	<u> </u>	_	1	
Stroma ESAP 2012	2 VERBIN 1.0.	196 (s	SAP 9.52) - http://	Ww.	stroma.com/ul	<u> </u>	ug Sep	Oct	Nov	Dec	Page	5 of 7

(86)m=	1 0.99	0.99	0.97	0.91	0.79	0.65	0.72	0.91	0.98	0.99	1		(86)
Mean inte	ernal tempe	erature in	living are	ea T1 (fc	ollow ste	ps 3 to 7	in Table	e 9c)					
	9.15 19.31	19.63	20.07	20.51	20.81	20.94	20.91	20.64	20.1	19.55	19.13		(87)
Tempera	ture during	heating p	eriods ir	rest of	dwelling	from Ta	ble 9, Ti	 h2 (°C)				•	
· —	9.56 19.56	19.56	19.57	19.58	19.59	19.59	19.59	19.58	19.58	19.57	19.57		(88)
Utilisatio	n factor for	gains for	rest of d	wellina. I	h2.m (se	e Table	9a)					!	
	1 0.99	0.98	0.95	0.87	0.68	0.47	0.55	0.84	0.97	0.99	1		(89)
Mean into	ernal tempe	erature in	the rest	of dwelli	na T2 (fo	ollow ste	eps 3 to 7	7 in Tabl	e 9c)			l	
	7.16 17.39	17.85	18.5	19.09	19.46	19.56	19.55	19.29	18.55	17.75	17.12		(90)
	!							f	LA = Livin	g area ÷ (4	4) =	0.25	(91)
Mean into	ernal tempe	erature (fo	or the wh	ole dwel	llina) = fl	LA × T1	+ (1 – fL	A) x T2			!		_
	7.66 17.87	18.29	18.89	19.44	19.8	19.91	19.89	19.63	18.94	18.2	17.62		(92)
Apply ad	justment to	the mear	internal	tempera	ature fro	m Table	4e, whe	ere appro	priate	Į.	ļ.		
(93)m= 17	7.66 17.87	18.29	18.89	19.44	19.8	19.91	19.89	19.63	18.94	18.2	17.62		(93)
8. Space	heating re	quiremen	t										
	the mean i		•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
	ation factor				lun	list	۸۰۰۰	Con	Oct	Nov	Doo		
	lan Feb n factor for		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	.99 0.99	0.98	0.94	0.86	0.7	0.52	0.59	0.84	0.96	0.99	0.99		(94)
` ′	ains, hmGm					****					5.55		` '
	7.25 390.43	 	488.38	493.07	401.72	280.7	288.14	363.16	358.84	335.19	330.54		(95)
Monthly a	average ex	ernal tem	perature	from Ta	able 8							l	
(96)m= 4	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss	s rate for m	ean interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	ı	ı	· I	
` ′	13.97 1176.8		897.15	694.28	462.86	294.4	310.22	493.21	747.49	998.66	1211.5		(97)
· —	eating requi	1						``	- `	r	ı	ı	
(98)m= 64	4.84 528.47	468.23	294.31	149.71	0	0	0	0	289.16	477.7	655.43		٦,,,,,,
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	3507.84	(98)
Space he	eating requi	rement in	kWh/m²	/year								64.55	(99)
9a. Energ	y requireme	ents – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space h	_			, .							ĺ		¬
	of space he				mentary	-						0	(201)
	of space he		-	. ,			(202) = 1 -					1	(202)
Fraction	of total hea	ting from	main sys	stem 1			(204) = (204)	02) × [1 –	(203)] =			1	(204)
Efficiency	y of main sp	ace heat	ing syste	em 1								93.4	(206)
Efficienc	y of second	ary/suppl	ementar	y heating	g system	າ, %						0	(208)
J	lan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space he	eating requi	rement (d	alculate	d above)								•	
64	4.84 528.47	468.23	294.31	149.71	0	0	0	0	289.16	477.7	655.43		
(211)m =	{[(98)m x (2	04)] } x 1	00 ÷ (20	6)		•	•	•	•	•			(211)
69	0.41 565.81	501.32	315.1	160.28	0	0	0	0	309.59	511.45	701.75		_
							Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3755.71	(211)

Space heating fuel (secondary), kWh/month								
= {[(98)m x (201)] } x 100 ÷ (208)		т т					1	
(215)m= 0 0 0 0 0	0 0	0	0	0	0	0		7
		Total	(kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water heating								
Output from water heater (calculated above) 169.6	16.58 111.69	124.51	125.88	143.34	153.02	165.61]	
Efficiency of water heater				ļ	ļ		80.3	(216)
(217)m= 88.09 87.98 87.67 86.93 85.36	80.3 80.3	80.3	80.3	86.78	87.72	88.16		(217)
Fuel for water heating, kWh/month	!						1	
(219) m = (64) m x $100 \div (217)$ m (219)m = 192.52 168.39 175.82 157.26 155.06 1	45.18 139.09	155.05	156.77	165.17	174.43	187.85	1	
(219)m= 192.52 168.39 175.82 157.26 155.06 1	45.16 139.09			19a) ₁₁₂ =	174.43	167.65	1972.6	(219)
Annual totals			(-		Wh/year	•	kWh/year	
Space heating fuel used, main system 1					you		3755.71	7
Water heating fuel used							1972.6	<u> </u>
Electricity for pumps, fans and electric keep-hot								_
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(231)
Electricity for lighting							250.97	(232)
12a. CO2 emissions – Individual heating system	s including mi	icro-CHP						
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	811.23	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	426.08	(264)
Space and water heating	(261) + (262)	+ (263) + (2	264) =				1237.31	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	130.26	(268)
Total CO2, kg/year			sum o	of (265)(2	271) =		1406.5	(272)

TER =

(273)

25.88

		l lsar I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	roperty	Address	: Flat 4-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:								
1. Overall awailing aime		Are	a(m²)		Av. He	ight(m)		Volume(m	3)
Basement		:	55.61	(1a) x	2	2.6	(2a) =	144.59	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	55.61	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	144.59	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	_ + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	7 + [0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				2	x '	10 =	20	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires				0	x	40 =	0	(7c)
				_			A: I-		—
	(0.) (0.)	- > (-1)	(-)	_			ı	nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	20 rom (9) to		÷ (5) =	0.14	(8)
Number of storeys in t		u to (/),			o (o) to	(1.0)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
deducting areas of openi	resent, use the value corresponding t ngs); if equal user 0.35	o ine grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2) v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15)
	q50, expressed in cubic metre	es per h					area	5	(17)
,	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•				0.39	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	ed		(20) = 1 -	[0 075 v /	10\1 -			3	(19)
Shelter factor Infiltration rate incorpora	ting shalter factor		(20) = 12 (21) = (18)		19)] =			0.78	(20)
Infiltration rate modified f	•		(21) = (10) X (20) =				0.3	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp			<u>, </u>		1	1		I	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) (2	2)m : 4							-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]	
1.20	1 0.95	1 0.00	1 0.02	<u> </u>	1	12	Io	I	

Adjusted infiltra	ation rate	(allowi	ng for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.38	0.38	0.37	0.33	0.32	0.29	0.29	0.28	0.3	0.32	0.34	0.35]	
Calculate effec		•	rate for t	he appli	cable ca	se	!		!		<u> </u>	_	
If mechanica			on dia N. (O	OL) (OO)	-) - - - /		NIT\\ - db -		(00-)			0	(23a
If exhaust air he		0		, ,	,	. `	,, .	`	o) = (23a)			0	(23b
If balanced with		-	-	_								0	(230
a) If balance	d mechar		ntilation	with he	1	ery (MV	HR) (24a	a)m = (2)	2b)m + (23b) × [1 – (23c)) ÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a
b) If balance					1	 	, 	í `	r ´ `	· ·	1	1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b
c) If whole he				•					E (00l-	. \			
	0.5×0	<u> </u>			i 	· `	, ` ` ` 	ŕ	· ` `		1 0	1	(24c
(24c)m= 0		0	0	0	0	0	0	0	0	0	0	J	(240
d) If natural v if (22b)m	ventilation n = 1, thei			•					0.5]				
(24d)m= 0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d
Effective air	change ra	ate - en	iter (24a) or (24h	o) or (24	c) or (24	ld) in box	x (25)					
(25)m= 0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56]	(25)
3. Heat losses	s and hea	it loss p	paramete	er:								_	
ELEMENT	Gross area (ı	;	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/l	K)	k-valu kJ/m².		A X k kJ/K
Doors		,			2.6	x	1	=	2.6	,			(26)
Windows Type	1				4.69	x1	/[1/(1.4)+	0.04] =	6.22				(27)
Windows Type	2				1.44	x1	/[1/(1.4)+	0.04] =	1.91				(27)
Windows Type	3				0.49	x1	/[1/(1.4)+	0.04] =	0.65	=			(27)
Walls Type1	34.66		11.3	1	23.35	x	0.18		4.2	=			(29)
Walls Type2	23.92	_	2.6	=	21.32	=	0.18	= =	3.84	=		-	(29)
Walls Type3	2.63	=	0	=	2.63		0.18		0.47	륵 ¦		-	(29)
Walls Type4	25.13		0	=		=		$\dashv [$	4.52	믁 ¦		-	(29)
Roof				=	25.13	=	0.18	_				_	
	55.61	 m²	0		55.6	=	0.13	=	7.23				(30)
Total area of el	iements,	111~			141.9	=		_					(31)
Party wall					7.81	=	0	=	0			_	(32)
Party floor					55.6								(32a
* for windows and ** include the area						lated using	g formula 1	/[(1/U-valt	ue)+0.04] a	as given in	n paragrapi	h 3.2	
	s. W/K =	S (A x	U)				(26)(30)) + (32) =				37.86	(33)
Fabric heat los	-,							((20)	(30) + (30)	2) + (32a).	(32e) =	18867.	(24)
Heat capacity (xk)						((20).	(00) . (01	/ (/	(323)	10007.	19 (34)
	Cm = S(A	,	P = Cm ÷	- TFA) ir	n kJ/m²K	,			ative Value	, , ,	(023)	250	
Heat capacity (Cm = S(A paramete ments when	er (TMF	tails of the	•			recisely the	Indica	ative Value	: Medium	, ,		(34)
Heat capacity (Thermal mass For design assess	Cm = S(A paramete ments when ad of a deta	er (TMF re the dei iled calcu	tails of the ulation.	construct	tion are no	t known pi	recisely the	Indica	ative Value	: Medium	, ,		(35)

Total fabric heat loss (33) + (68) = (37) (37)	Total fabric book loss			(22)	(20)				— (07)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec						'25\m v (5\		63.74	(37)
(38)		ابرا ا	T Aug			1			
Heat transfer coefficient, W/K (38)m= (37) + (38)m (39)m= (37) + (38)m (39)m= (37) + (38)m Average = Sum(38) ₁₋₁₂ /12= 90.21 (39) Heat loss parameter (HLP), W/m²K (40)m= (38)m + (3)m +			t 			_			(38)
Signare 19.11 19.97 90.84 90.21 80.99 89.54 89.54 89.46 89.76 90.09 90.33 90.58			1			<u> </u>			,
Average Sum(30)		4 89.54	89.44			·	90.58		
(40)me 1.64 1.64 1.63 1.62 1.62 1.61 1.61 1.61 1.61 1.61 1.62 1.62 1.63					L Average =	Sum(39) ₁ .	12 /12=	90.21	(39)
Average = Sum(40)	Heat loss parameter (HLP), W/m²K		_	(40)m	= (39)m ÷	(4)			
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 1.64 1.64 1.63 1.62 1.62 1.66	1.61	1.61	1.61	1.62	1.62	1.63		_
### A. Water heating energy requirement: ### A. Sumed occupancy, N If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (alwater usa, hot and cool) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) ### (44) ### B6.00 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 ### Total = Sum(44)= 939.13	Number of days in month (Table 1a)			,	Average =	Sum(40) _{1.}	12 /12=	1.62	(40)
### Assumed occupancy, N If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table to x (43) [44]me 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Total = Sum(44),= 939.13 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3000 kWh/month (see Tables 1b, 1c, 1d) [45]me 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 Total = Sum(44),= 100.45 113.85 123.64 ### Apr May May May May May May May May May May	Jan Feb Mar Apr May Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA > 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water usa, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd, m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Finergy content of hot water used - calculated monthly = 4.190 x Vd, m x nm x DTm / 3600 kWh/month (see Tables 1b. 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Vater storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	(41)m= 31 28 31 30 31 30	31	31	30	31	30	31		(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA > 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water usa, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd, m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Finergy content of hot water used - calculated monthly = 4.190 x Vd, m x nm x DTm / 3600 kWh/month (see Tables 1b. 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Vater storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)		•						•	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd_average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd_m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Total = Sum(44) = 939.13 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd_m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 Total = Sum(45) = 1231.35 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2b 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	4. Water heating energy requirement:						kWh/ye	ear:	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd_average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd_m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Total = Sum(44) = 939.13 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd_m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 Total = Sum(45) = 1231.35 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2b 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	Assumed assumency N							1	(10)
if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	1 2'	(TFA -13.9	9)2)] + 0.0	0013 x (ΓFA -13.		86		(42)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWr/month (see Tables 1b, 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Water storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (50) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	if TFA £ 13.9, N = 1	•	, ,-	·					
Sep Oct Nov Dec Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)		_	` ,		e target o		.26		(43)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Total = Sum(44)		•	to acriicve	a water us	ic larger o	1			
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70.44 73.57 76.7 79.83 82.96 86.09 Total = Sum(44)	Jan Feb Mar Apr May Ju	n Jul	Aug	Sen	Oct	Nov	Dec		
Total = Sum(44) ₁₋₁₂ = 939.13 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 Total = Sum(45) ₁₋₁₂ = 1231.35 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)				Сор	00.	1101			
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 127.67	(44)m= 86.09 82.96 79.83 76.7 73.57 70.4	4 70.44	73.57	76.7	79.83	82.96	86.09		
(45)me 127.67 111.66 115.22 100.45 96.39 83.17 77.07 88.44 89.5 104.3 113.85 123.64 Total = Sum(45)2 = 1231.35 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)me 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: 0 (51) Hot water storage loss factor from Table 2 (_	-	Γotal = Su	m(44) ₁₁₂ =		939.13	(44)
Total = Sum(45) Total = Sum(45)	Energy content of hot water used - calculated monthly = 4.190 x \	/d,m x nm x	DTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)	•	
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	(45)m= 127.67 111.66 115.22 100.45 96.39 83.1	7 77.07	88.44	!			<u> </u>		_
(46)me 19.15 16.75 17.28 15.07 14.46 12.48 11.56 13.27 13.42 15.65 17.08 18.55 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x	If instantaneous water heating at point of use (no hot water storage	ne), enter 0 ir	n boxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1231.35	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)		·	T		15.65	17.08	18 55		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54)		0 11.50	10.27	10.42	10.00	17.00	10.00		(10)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (51) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = o (54)	Storage volume (litres) including any solar or WWHF	RS storage	within sa	ame ves	sel		0		(47)
Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (50) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54)	If community heating and no tank in dwelling, enter 1	10 litres ir	า (47)						
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (48) (49) 0 (50) (51) (51) (52) (53) Energy lost from water storage, kWh/year	•	taneous c	ombi boil	ers) ente	er '0' in (47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (49) (49) (49) (50) (51) (51) (52) (52) (53)	_	Mb/dow					_	I	(40)
Energy lost from water storage, kWh/year (48) \times (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) \times (51) \times (52) \times (53) = 0 (54)	, ·	vvii/uay).							, ,
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54)	·		(49) v (40)	\ _					, ,
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (51) (52) (53)	• •	not known:	` ' ' ') =			0		(50)
Volume factor from Table 2a0(52)Temperature factor from Table 2b0(53)Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ 0(54)	· ·						0		(51)
Temperature factor from Table 2b	, and the second								
Energy lost from water storage, kWh/year $ (47) \times (51) \times (52) \times (53) = 0 $ (54)									
							0		, ,
© (55)			(47) x (51)) x (52) x (53) =	—			
	Lines (50) or (54) in (55)						U		(35)

Primary circuit loss (annual) from Table 3 0 (58) Primary circuit loss calculated for each month (59)m = (58) \div 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat) (59)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat) (59)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat) $ (59)m = 0 $
(59)m=
Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$ $(61)m = 43.87 38.18 40.68 37.82 37.49 34.74 35.89 37.49 37.82 40.68 40.91 43.87$ $Total heat required for water heating calculated for each month (62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$
(61)m= 43.87 38.18 40.68 37.82 37.49 34.74 35.89 37.49 37.82 40.68 40.91 43.87 (61) Total heat required for water heating calculated for each month (62)m = $0.85 \times (45)$ m + (46)m + (57)m + (59)m + (61)m
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$
(62)m= 171.53 149.84 155.9 138.27 133.87 117.91 112.97 125.93 127.32 144.98 154.76 167.51 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)
(63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 (63)
Output from water heater
(64)m= 171.53 149.84 155.9 138.27 133.87 117.91 112.97 125.93 127.32 144.98 154.76 167.51
Output from water heater (annual) ₁₁₂ 1700.79 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]
(65)m= 53.42 46.67 48.48 42.86 41.42 36.34 34.6 38.78 39.21 44.85 48.08 52.08 (65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating
5. Internal gains (see Table 5 and 5a):
Metabolic gains (Table 5), Watts
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(66)m= 92.76 92.76 92.76 92.76 92.76 92.76 92.76 92.76 92.76 92.76 92.76 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
(67)m= 14.5 12.88 10.47 7.93 5.93 5 5.41 7.03 9.43 11.98 13.98 14.9 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
(68)m= 161.76 163.43 159.2 150.2 138.83 128.15 121.01 119.33 123.56 132.57 143.94 154.62 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
(69)m= 32.28
Pumps and fans gains (Table 5a)
(70)m= 3 3 3 3 3 3 3 3 3 3 3 (70)
Losses e.g. evaporation (negative values) (Table 5)
(71)m= -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 -74.21 (71)
Water heating gains (Table 5)
(72)m= 71.8 69.45 65.16 59.52 55.67 50.47 46.51 52.12 54.46 60.28 66.78 70 (72)
//
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$
Total internal gains = $ (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m $ $ (73)m = 301.88 299.59 288.67 271.48 254.26 237.45 226.75 232.31 241.29 258.66 278.52 293.34 $ $ (73)$

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b	-	FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	4.69	x	11.28	x	0.63	x	0.7	= [32.34	(75)
Northeast 0.9x 0.77	x	4.69	x	22.97	x	0.63	x	0.7	= [65.84	(75)
Northeast 0.9x 0.77	x	4.69	x	41.38	X	0.63	x	0.7	= [118.62	(75)
Northeast 0.9x 0.77	x	4.69	x	67.96	x	0.63	x	0.7	= [194.81	(75)
Northeast 0.9x 0.77	X	4.69	x	91.35	X	0.63	x	0.7	=	261.86	(75)
Northeast 0.9x 0.77	X	4.69	x	97.38	X	0.63	x	0.7	= [279.17	(75)
Northeast 0.9x 0.77	X	4.69	x	91.1	X	0.63	x	0.7	= [261.16	(75)
Northeast 0.9x 0.77	x	4.69	x	72.63	X	0.63	x	0.7	= [208.2	(75)
Northeast 0.9x 0.77	X	4.69	x	50.42	X	0.63	x	0.7	= [144.54	(75)
Northeast 0.9x 0.77	X	4.69	x	28.07	X	0.63	x	0.7	= [80.46	(75)
Northeast _{0.9x} 0.77	X	4.69	x	14.2	X	0.63	x	0.7	= [40.7	(75)
Northeast 0.9x 0.77	X	4.69	x	9.21	X	0.63	x	0.7	= [26.41	(75)
Southwest _{0.9x} 0.77	X	1.44	x	36.79		0.63	x	0.7	= [16.19	(79)
Southwest _{0.9x} 0.77	x	0.49	x	36.79		0.63	x	0.7	= [5.51	(79)
Southwest _{0.9x} 0.77	X	1.44	x	62.67]	0.63	x	0.7	= [27.58	(79)
Southwest _{0.9x} 0.77	x	0.49	x	62.67		0.63	x	0.7	= [9.39	(79)
Southwest _{0.9x} 0.77	X	1.44	x	85.75		0.63	x	0.7	= [37.74	(79)
Southwest _{0.9x} 0.77	X	0.49	x	85.75		0.63	x	0.7	= [12.84	(79)
Southwest _{0.9x} 0.77	X	1.44	x	106.25		0.63	x	0.7	= [46.76	(79)
Southwest _{0.9x} 0.77	X	0.49	x	106.25		0.63	x	0.7	= [15.91	(79)
Southwest _{0.9x} 0.77	X	1.44	x	119.01]	0.63	x	0.7	= [52.37	(79)
Southwest _{0.9x} 0.77	X	0.49	x	119.01		0.63	x	0.7	= [17.82	(79)
Southwest _{0.9x} 0.77	x	1.44	x	118.15		0.63	x	0.7	= [52	(79)
Southwest _{0.9x} 0.77	X	0.49	x	118.15		0.63	x	0.7	= [17.69	(79)
Southwest _{0.9x} 0.77	X	1.44	x	113.91		0.63	x	0.7	= [50.13	(79)
Southwest _{0.9x} 0.77	X	0.49	X	113.91		0.63	x	0.7	= [17.06	(79)
Southwest _{0.9x} 0.77	X	1.44	X	104.39		0.63	x	0.7	= [45.94	(79)
Southwest _{0.9x} 0.77	X	0.49	X	104.39		0.63	Х	0.7	= [15.63	(79)
Southwest _{0.9x} 0.77	X	1.44	x	92.85		0.63	x	0.7	= [40.86	(79)
Southwest _{0.9x} 0.77	X	0.49	x	92.85		0.63	х	0.7	= [13.9	(79)
Southwest _{0.9x} 0.77	X	1.44	x	69.27		0.63	Х	0.7	=	30.48	(79)
Southwest _{0.9x} 0.77	X	0.49	x	69.27		0.63	Х	0.7	= [10.37	(79)
Southwest _{0.9x} 0.77	X	1.44	x	44.07		0.63	х	0.7	=	19.39	(79)
Southwest _{0.9x} 0.77	X	0.49	x	44.07		0.63	х	0.7	= [6.6	(79)
Southwest _{0.9x} 0.77	X	1.44	x	31.49		0.63	х	0.7	= [13.86	(79)
Southwest _{0.9x} 0.77	X	0.49	x	31.49		0.63	х	0.7	= [4.72	(79)
Solar gains in watts, calcula (83)m= 54.05 102.8 169		for each mon 257.48 332.0	$\overline{}$	48.86 328.34	(83)m 269	n = Sum(74)m .	(82)m 121.32	66.69	44.99		(83)
Total gains – internal and s						1		1			` '
(84)m= 355.92 402.4 457		528.95 586.3	<u> </u>	86.31 555.09	502	.08 440.59	379.97	345.22	338.33		(84)
		·		1	1	I	<u> </u>	Į.			

7. Me	an inter	nal temr	perature	(heating	season)								
			neating p			•	from Tal	ole 9. Th	1 (°C)				21	(85)
•		_	ains for l			•		,	(-)					``
•	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.99	0.97	0.91	0.79	0.64	0.71	0.9	0.98	0.99	1		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.19	19.35	19.66	20.1	20.52	20.82	20.94	20.91	20.66	20.12	19.58	19.16		(87)
Temp	erature	during h	neating p	eriods ir	rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.59	19.59	19.59	19.6	19.6	19.61	19.61	19.61	19.6	19.6	19.6	19.59		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	1	0.99	0.98	0.95	0.86	0.68	0.47	0.54	0.84	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	e 9c)				
(90)m=	17.23	17.46	17.91	18.55	19.13	19.49	19.59	19.57	19.32	18.59	17.81	17.19		(90)
		-	-			-	-	-	f	LA = Livin	g area ÷ (4	4) =	0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	17.73	17.94	18.36	18.94	19.49	19.83	19.93	19.92	19.66	18.98	18.26	17.69		(92)
Apply	adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	17.73	17.94	18.36	18.94	19.49	19.83	19.93	19.92	19.66	18.98	18.26	17.69		(93)
			uirement											
			ternal ter or gains	•		ned at sto	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:		,	,	,		•	,			
(94)m=	0.99	0.99	0.98	0.94	0.86	0.7	0.51	0.58	0.84	0.96	0.99	0.99		(94)
			W = (94)											(05)
(95)m=	353.68	398.15	447.8 ernal tem	499.11	503.48	409.12	285.4	293.2	370.53	366.15	341.53	336.57		(95)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern			l	l			ļ	'	7.2		(55)
		· -	1077.16		701.61	468.45	298.5	314.53	499.12	755.34	1008.17	1222.18		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Mh/mon [·]	th = 0.02	24 x [(97)m – (95)m] x (4	1)m	<u> </u>		
(98)m=	647.23	529.81	468.24	293.06	147.41	0	0	0	0	289.56	479.98	658.89		
						•		Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	3514.18	(98)
Space	e heatin	g require	ement in	kWh/m²	/year								63.19	(99)
9a. En	ergy red	quiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)			·		
-	e heatir	_	at from s	ooondor	u/auppla	monton	, avatam						0	(201)
						memary	System	(202) = 1	_ (201) _				0	= ' '
			at from m	-	` ,			` '	- (201) = 02) × [1 –	(203)1 –			1	(202)
			ng from	-				(204) = (2	∪∠ <i>)</i> × [1 —	(203)] =			1	(204)
	•	•	ace heat			a ovete-	n 0/						93.4	(206)
ETTICIE	ency of s	seconda	ry/suppl	ementar	y neating	y systen	1, %						0	(208)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space heatin	ř	· `	1		1	ı	ı		ı	ı	ı	1	
647.23	529.81	468.24	293.06	147.41	0	0	0	0	289.56	479.98	658.89		
(211)m = {[(98	í `	- 	<u> </u>			l -						1	(211)
692.96	567.24	501.33	313.76	157.83	0	0	O Tota	0 L (k\\/b\/vor	310.02 ar) =Sum(2	513.9	705.45		7(044)
On and breatin	f1 /-			41-			TUld	i (Kvvii/yea	ai) =Suiii(2	211) _{15,1012}	Ē	3762.5	(211)
Space heatin $= \{[(98)m \times (200)]$	•		• •	montn									
(215)m = 0	0	0	0	0	0	0	0	0	0	0	0]	
	Į.	!				!	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u> </u>	0	(215)
Water heating	3												_
Output from w					·					 		1	
171.53	149.84	155.9	138.27	133.87	117.91	112.97	125.93	127.32	144.98	154.76	167.51		7
Efficiency of w												80.3	(216)
(217)m= 88.08	87.96	87.65	86.9	85.29	80.3	80.3	80.3	80.3	86.76	87.71	88.15		(217)
Fuel for water $(219)m = (64)$	-												
(219)m= 194.75	170.35	177.87	159.13	156.96	146.83	140.68	156.82	158.56	167.11	176.45	190.02]	
							Tota	I = Sum(2	19a) ₁₁₂ =			1995.52	(219)
Annual totals									k\	Wh/year	ē	kWh/year	_
Space heating	fuel use	ed, main	system	1								3762.5	_
Water heating	fuel use	ed										1995.52	
Electricity for p	oumps, f	ans and	electric	keep-ho	t								
central heatin	ng pump	:									30]	(230c)
boiler with a f	an-assis	sted flue									45]	(230e)
Total electricity	y for the	above, I	kWh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electricity for li	ighting											256.04	(232)
12a. CO2 em	issions -	– Individ	ual heati	ng syste	ems inclu	uding mi	cro-CHF)					
					En	ergy			Emiss	ion fac	tor	Emissions	
						/h/year			kg CO			kg CO2/yea	ar
Space heating	(main s	system 1)		(21	1) x			0.2	16	=	812.7	(261)
Space heating	(second	dary)			(21	5) x			0.5	19	=	0	(263)
Water heating					(219	9) x			0.2	16	=	431.03	(264)
Space and wa	ter heati	ing			(26	1) + (262)	+ (263) + (264) =				1243.73	(265)
Electricity for p	oumps, f	ans and	electric	keep-ho	t (23	1) x			0.5	19	=	38.93	(267)
Electricity for li	ighting				(232	2) x			0.5	19	=	132.89	(268)
Total CO2, kg/	/year							sum o	of (265)(2	271) =		1415.54	(272)
													_
TER =												25.45	(273)

				User D	etails:						
Assessor Name: Software Name:	Chris Hocl Stroma FS	_	2		Strom Softwa					016363 on: 1.0.4.10	
			P	roperty	Address	: Flat 0-1	I-Lean				
Address :											
1. Overall dwelling dime	ensions:				(0)						
Basement					a(m²) 13.25	(1a) x		ight(m) 3.1	(2a) =	Volume(m³)) (3a)
Ground floor						(1b) x		2.6](2b) =	166.11	` (3b)
Total floor area TFA = (1	a)+(1b)+(1c)+	(1d)+(1e)+(1n) 1	07.14	(4)]		
Dwelling volume	, , , , , ,	, , ,	, (′)+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:											` ′
2. Verillation rate.	main		econdar	y	other		total			m³ per hou	r
Number of chimneys	heating 0	+ <u></u>	eating 0] + [0] = [0	x 4	40 =	0	(6a)
Number of open flues	0		0	 	0	j = F	0	x2	20 =	0	(6b)
Number of intermittent fa	ans						0	x ′	10 =	0	(7a)
Number of passive vents	5					Ē	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires					Ē	0	X 4	40 =	0	(7c)
						_					
									Air ch	anges per ho	ur
Infiltration due to chimne	•						0		÷ (5) =	0	(8)
If a pressurisation test has l Number of storeys in t			ed, proceed	d to (17),	otherwise (continue fr	om (9) to ((16)			7(0)
Additional infiltration	ine aweiling (in	>)						[(0).	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0) 25 for steel o	r timber f	rame or	0 35 fo	r masoni	v constr	ruction	[(9)	- i jx0. i =	0	(10)
if both types of wall are p						•	uction			0	(11)
deducting areas of openi	ings); if equal user	0.35									
If suspended wooden	floor, enter 0.2	(unseal	ed) or 0.	1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else	enter 0								0	(13)
Percentage of window	s and doors d	aught st	ripped							0	(14)
Window infiltration					0.25 - [0.2		-			0	(15)
Infiltration rate					(8) + (10)		, , ,	, ,		0	(16)
Air permeability value,	•			•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabi	•									0.15	(18)
Air permeability value applie Number of sides sheltere	•	on test has	been don	e or a de	gree air pe	rmeability	is being us	sed			7(40)
Shelter factor	eu				(20) = 1 -	[0.075 x (1	9)] =			0.85	(19)
Infiltration rate incorpora	ting shelter fac	etor			(21) = (18) x (20) =	/ -			0.03	(21)
Infiltration rate modified	•				, , , , ,	,				0.13	(~1)
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
L		- 1		- Cui	19	1 200	1 500	1	1 200		
Monthly average wind sp (22)m= 5.1 5	4.9 4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A.P. stadis Classica and	- /-!!- '	(-11			(04 -)	(00-)	•			l	
Adjusted infiltration rat	e (allowi	ng for sr 0.14	0.14	a wina s	o.12	0.12	(22a)m 0.13	0.14	0.14	0.15		
Calculate effective air		1			I	0.12	0.13	0.14	0.14	0.15		
If mechanical ventila	ation:										0.5	(23a)
If exhaust air heat pump								o) = (23a)			0.5	(23b)
If balanced with heat reco	•	•	•		,	,	,				76.5	(23c)
a) If balanced mech					- ` ` 	- ^ ` 	ŕ	 		``	÷ 100]	(24a)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mecha	anicai ve	entilation 0	without	neat rec	overy (r	VIV) (246 1 0	0 m = (2)	$\frac{26}{1}$ $\frac{1}{0}$	23b) 0	0		(24b)
c) If whole house ex								0	0	U		(240)
if (22b)m < 0.5 ×			•	-				.5 × (23b)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation	on or wh	ole hous	e positiv	e input	ventilatio	on from I	oft				l	
if (22b)m = 1, th	en (24d)	m = (22l	o)m othe	rwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]			ı	
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change	1	<u> </u>	<u> </u>	``	ŕ		` ´ ´ 				l	(05)
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and he	eat loss p	paramete	er:									
3. Heat losses and he ELEMENT Gros	SS	oaramete Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/F	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gros	SS	Openin	gs			W/m2			<) 			
ELEMENT Gros	SS	Openin	gs	A ,r	m² x	W/m2	=	(W/I	<) 			kJ/K
ELEMENT Gros area Doors	SS	Openin	gs	A ,r	m ² x 2 x ¹	W/m2	eK = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gros area Doors Windows Type 1	SS	Openin	gs	A ,r 2.6	m ² x 2 x ¹ x ¹	W/m2 1.2 /[1/(1.2)+	0.04] = 0.04] =	(W/F 3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2	SS	Openin	gs	A ,r 2.6 13.52 2.73	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/H 3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54 3.51	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02	<)			kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	ss (m²)	Openin	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575	<)			kJ/K (26) (27) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509	\() \(kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = 0.	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2	ss (m²)	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04]	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 Walls Type3 43.	32 38 4 22	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type4	32 32 38 4 22	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.2	32 (m²) 38 4 22 7	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 20.6 Walls Type3 43. Walls Type4 Walls Type4 Cancer 11.4	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.4 Roof Type2 4.8	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22 6.27 11.42 4.83	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

Party of	eilina					59.06					Г			(32b)
-	•	roof winde	ows, use e	effective wi	ndow U-va			formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		(02.5)
				nternal wal							-			
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.12	(33)
		Cm = S(((28)	.(30) + (32	2) + (32a)	(32e) =	34247.85	(34)
		-		P = Cm -						tive Value			250	(35)
	•		ere the de tailed calcı		constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
				culated (using Ap	pendix k	<					[36.66	(36)
	•	,	,	own (36) =		•						L		`
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea	t loss ca	alculated	monthly	У				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer o	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		
Hoot le		motor (L	TI D) \\\\	/m21/							Sum(39) _{1.}	12 /12=	133.24	(39)
(40)m=	1.26	1.26	HLP), W/	1.24	1.24	1.23	1.23	1.22	1.23	= (39)m ÷	1.25	1.25		
(40)111=	1.20	1.20	1.20	1.24	1.24	1.23	1.23	1.22			Sum(40) ₁ .		1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Wordgo =	Cum (10)	12712—	1.21	(10)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
							5	31	50	0.				
				l			01	31	50	01				
4. Wa	iter heat	ing enei	rgy requi	irement:			01	31	30	01		kWh/ye	ear:	
				irement:			31	31	30			kWh/ye	ear:	(42)
Assum	ied occu	pancy, I	N	irement:	(-0.0003						2	kWh/ye	ear:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	pancy, I 9, N = 1 9, N = 1	N + 1.76 x	:[1 - exp	`	349 x (TF	FA -13.9)2)] + 0.0	0013 x (2	kWh/ye	ear:	, ,
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	pancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	: [1 - exp ge in litre	s per da	349 x (TF	FA -13.9) erage =)2)] + 0.0 (25 x N)	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa la average	N + 1.76 x ater usag hot water	:[1 - exp	es per da 5% if the o	349 x (TF ay Vd,av lwelling is	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa la average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da 5% if the o	349 x (TF ay Vd,av lwelling is	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	pancy, I 9, N = 1 9, N = 1 e hot wa la average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is not and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	pancy, I 9, N = 1 9, N = 1 e hot wa la average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is not and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I ipancy, I	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (⁻ + 36 a water us Sep	FFA -13. se target o Oct 102.63 Total = Su	9) 100 Nov 106.65 m(44)112 =	kWh/ye .8 0.62 Dec 110.68	par: 1207.41	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar aday for ear 102.63	ge in litre usage by r day (all w Apr ach month 98.61	es per da 5% if the or vater use, I May $Vd, m = fa$ 94.58	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	FFA -13. See target of Oct 102.63 Total = Sunth (see Tail	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 Dec 110.68		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I ipancy, I	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61 98.61 115.06	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1. 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	pancy, I P, N = 1 P, N = 1 e hot wa blaverage litres per p Feb n litres per 106.65 hot water 143.55	H + 1.76 x ater usage hot water person per Mar 102.63 used - calconders 148.13	ge in litre usage by r day (all w Apr ach month 98.61	es per da 5% if the orater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,ave lwelling is not and co. Jun ctor from T 90.56	FA -13.9) erage = designed to	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71	98.61 98.61 115.06	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	pancy, I P, N = 1 P, N = 1 e hot wa blaverage litres per p Feb n litres per 106.65 hot water 143.55	H + 1.76 x ater usage hot water person per Mar 102.63 used - calconders 148.13	ge in litre usage by a day (all wash month 98.61	es per da 5% if the orater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,ave lwelling is not and co. Jun ctor from T 90.56	FA -13.9) erage = designed to	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71	98.61 98.61 115.06	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1. 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage	ppancy, I p, N = 1 e hot wa al average litres per p Feb 106.65 hot water 143.55 vater heatin 21.53 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 102.63 used - calculated 148.13 and at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (not 19.37)	es per da 5% if the a vater use, I May $Vd,m = fa$ 94.58 $0nthly = 4$. 123.92 0 hot water 18.59	349 x (TF ay Vd,ave livelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46) 17.06	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ =	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum	pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I e hot water pancy, I pancy, + 1.76 x ater usage hot water person per Mar day for each 102.63 used - calconding at point 22.22	ge in litre usage by a day (all we hand) Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the orater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Total = Su 134.1 Total = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(43)	
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comi	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volumemunity h	ppancy, I p, N = 1 e hot wa al average litres per p Feb 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres)	H + 1.76 x ater usage hot water person per Mar 102.63 used - calc 148.13 ang at point 22.22 including and no talc 148.13	ge in litre usage by r day (all w Apr ach month 98.61 129.15 of use (not) 19.37 and any so	es per da 5% if the of rater use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 ame vess	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1. 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9	pancy, I p, N = 1 e hot wa laverage litres per p Teb n litres per 106.65 hot water 143.55 atter heatin 21.53 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar 102.63 used - calc 148.13 ang at point 22.22 including and no talc 148.13	ge in litre usage by a day (all we hand) Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of rater use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 ame vess	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1. 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity he wise if no storage	pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy e hot water 100.65 hot water 143.55 pater heatin 21.53 loss: e (litres) eating a pancy stored loss:	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - calconding at point 22.22 including and no talconding to talconding the calconding the calconding at point 22.22	ge in litre usage by r day (all w Apr ach month 98.61 129.15 of use (not) 19.37 and any so	es per da 5% if the o vater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e ocludes i	349 x (TF ay Vd,avelwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 ame vess	Oct 102.63 Total = Su 134.1 Total = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(43) (44) (45) (46)

Energy lost from water storage, kWh/year							
	(48) x (49)	=			0		(50)
b) If manufacturer's declared cylinder loss factor is not known	n:					· 	(54)
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3					0		(51)
Volume factor from Table 2a					0		(52)
Temperature factor from Table 2b					0		(53)
Energy lost from water storage, kWh/year	(47) x (51)	x (52) x (5	53) =		0		(54)
Enter (50) or (54) in (55)					0		(55)
Water storage loss calculated for each month	((56)m = (55) × (41)r	n				
(56)m= 0 0 0 0 0 0	0	0	0	0	0		(56)
If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div$	(50), else (5	7)m = (56)ı	m where (H11) is fro	m Append	ix H	
(57)m= 0 0 0 0 0 0	0	0	0	0	0		(57)
Primary circuit loss (annual) from Table 3	•				0		(58)
Primary circuit loss calculated for each month (59) m = $(58) \div$	365 × (41)	m				l	
(modified by factor from Table H5 if there is solar water hea	ating and a	cylinder	thermo	stat)			
(59)m= 0 0 0 0 0 0	0	0	0	0	0		(59)
Combi loss calculated for each month (61)m = (60) \div 365 × (4	11)m	-			-		
(61)m= 50.96 46.03 50.96 48.63 48.2 44.66 46.15	i	48.63	50.96	49.32	50.96		(61)
Total heat required for water heating calculated for each mon	th (62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2	- ` ´ 	163.69	185.05	195.69	209.91		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	tity) (enter '0		· contributi	on to wate	r heating)		
(add additional lines if FGHRS and/or WWHRS applies, see A			00.111.001				
(63)m= 0 0 0 0 0 0 0	0	0	0	0	0		(63)
Output from water heater	ļ	<u> </u>		<u> </u>			
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2	4 161.9	163.69	185.05	195.69	209.91		
		163.69 out from wa				2166.73	(64)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2	Outp	out from wa	ater heater	annual)₁	12		(64)
	Outp)m + (61)m	out from wa	ater heater	annual)₁	12		(64)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48	Outp)m + (61)m 3 49.86	out from wa n] + 0.8 x 50.42	(46)m 57.33	+ (57)m 61	+ (59)m 65.59	1	1
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the	Outp)m + (61)m 3 49.86	out from wa n] + 0.8 x 50.42	(46)m 57.33	+ (57)m 61	+ (59)m 65.59	1	1
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):	Outp)m + (61)m 3 49.86	out from wa n] + 0.8 x 50.42	(46)m 57.33	+ (57)m 61	+ (59)m 65.59	1	1
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	Outp 0m + (61)m 3 49.86 e dwelling	out from was a] + 0.8 x 50.42 or hot was	iter heater [(46)m 57.33 ater is fr	+ (57)m 61 om com	+ (59)m 65.59 munity h	1	1
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Outp 0m + (61)m 3 49.86 e dwelling	out from was 1] + 0.8 x 50.42 or hot was	i [(46)m 57.33 ater is fr	(annual), + (57)m 61 om com	+ (59)m 65.59 munity h	1	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the colspan="6">in the cylinder is in the cylinder in the cylinder is in the cylinder in the cylinder is in the cylinder in the cyli	Outp 0m + (61)m 3 49.86 e dwelling Aug 9 167.79	out from was 50.42 or hot was Sep 167.79	iter heater [(46)m 57.33 ater is fr	+ (57)m 61 om com	+ (59)m 65.59 munity h	1	1
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the final gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 167.79 167.	Outp)m + (61)m 3	Sep 167.79	oter heater 57.33 ater is fr Oct 167.79	(annual), + (57)m 61 om com Nov 167.79	+ (59)m 65.59 munity h	1	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylin	Outp 0m + (61)m 3	Sep 167.79 Table 5	oter heater 57.33 ater is fr Oct 167.79	(annual), + (57)m 61 om com	+ (59)m 65.59 munity h	1	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the colspan="6">in the colspan="6" in the colspan="6" in the colspan="6" in the colspan="6" in the colspan="6" in the colspan="6" in the colspan="6" in the colsp	Outp Om + (61)m 49.86 e dwelling Aug 9 167.79 , also see 2 28.89 13a), also	Sep 167.79 Table 5 38.77	Oct 167.79 49.23 ble 5	(annual) ₁ + (57)m 61 om com Nov 167.79	+ (59)m 65.59 munity h Dec 167.79	1	(65) (66) (67)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) / (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the colspan="6">include (57)m only if cylinder is in the cylinder is in the colspan="6">include (57)m only if cylinder is in the	Outp m + (61)m 49.86 e dwelling Aug 167.79 also see 2 28.89 13a), also 6 294.41	Sep 167.79 Table 5 38.77 see Table 304.85	Oct 167.79 49.23 ble 5 327.07	(annual), + (57)m 61 om com Nov 167.79	+ (59)m 65.59 munity h	1	(65)
(64)m= 215.09 189.58 199.09 177.77 172.12 151.59 145.2 Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculation of (65)m only if cylinder is in the colspan="6">include (57)m in calculated 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 167.79	Outp Om + (61)m 49.86 e dwelling Aug 167.79 also see 2 28.89 13a), also 6 294.41 5a), also se	Sep 167.79 Table 5 38.77 see Table	Oct 167.79 49.23 ble 5 327.07	(annual) ₁ + (57)m 61 om com Nov 167.79 57.46	+ (59)m 65.59 munity h Dec 167.79 61.25	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45)] (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the final state of the first of the firs	Outp Om + (61)m 3	Sep 167.79 Table 5 38.77 see Table 304.85	Oct 167.79 49.23 ble 5 327.07	(annual) ₁ + (57)m 61 om com Nov 167.79	+ (59)m 65.59 munity h Dec 167.79	1	(65) (66) (67)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the final state of the first o	Outp m + (61)m 49.86 e dwelling Aug 167.79 also see 2 28.89 13a), also 6 294.41 5a), also se 3 54.58	Sep 167.79 Table 5 38.77 see Table 54.58	Oct 167.79 49.23 ble 5 327.07 5 54.58	Nov 167.79 57.46 355.11	+ (59)m 65.59 munity h Dec 167.79 61.25 381.47	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ′ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the final factor of the first	Outp Om + (61)m 49.86 e dwelling Aug 167.79 also see 2 28.89 13a), also 6 294.41 5a), also se	Sep 167.79 Table 5 38.77 see Table	Oct 167.79 49.23 ble 5 327.07	(annual) ₁ + (57)m 61 om com Nov 167.79 57.46	+ (59)m 65.59 munity h Dec 167.79 61.25	1	(65) (66) (67) (68)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45) (65)m= 67.31 59.24 61.99 55.1 53.25 46.72 44.48 include (57)m in calculation of (65)m only if cylinder is in the final state of the first o	Outp m + (61)m 49.86 e dwelling Aug 9 167.79 , also see 2 28.89 13a), also 6 294.41 5a), also se 3 54.58	Sep 167.79 Table 5 38.77 see Table 54.58	Oct 167.79 49.23 ble 5 327.07 5 54.58	Nov 167.79 57.46 355.11	+ (59)m 65.59 munity h Dec 167.79 61.25 381.47	1	(65) (66) (67) (68)

Water heatir	ng gains (T	able 5)												
(72)m= 90.48	~~	83.33	76.52	71.58	64	4.89	59.79	67.	01 70.02	77.05	84.72	88.16]	(72)
Total intern	_!							+ (68	3)m + (69)m + (70)m +	(71)m + (72)	m	J	
(73)m= 662.6	_	632.66	593.19	551.96	51	<u> </u>	194.07	503	, , , , ,	566.8	<u> </u>	644.39]	(73)
6. Solar gai	ins:				<u> </u>									
		using solaı	r flux from	Table 6a	and	associat	ed equa	tions	to convert to the	e applic	able orientat	ion.		
Orientation:	Access F	actor	Area			Flux			g_		FF		Gains	
	Table 6d		m²			Table	e 6a		Table 6b		Table 6c		(W)	
Northeast 0.9	× 0.54	X	13.	52	x	11.:	28	x	0.24	X	0.7	=	12.46	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	11.:	28	X	0.24	x	0.7	=	3.59	(75)
Northeast 0.9	0.77	X	4.′	6	x	11.:	28	x	0.24	x	0.7	=	5.46	(75)
Northeast 0.9	v 0.54	X	13.	52	x	22.	97	X	0.24	X	0.7	=	25.35	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	22.	97	X	0.24	X	0.7	=	7.3	(75)
Northeast 0.9	× 0.77	X	4.′	6	x	22.	97	x	0.24	X	0.7	=	11.12	(75)
Northeast 0.9	v 0.54	X	13.	52	X	41.	38	X	0.24	X	0.7	=	45.68	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	41.	38	x	0.24	x	0.7	=	13.15	(75)
Northeast 0.9	0.77	X	4.′	6	x	41.	38	X	0.24	x	0.7	=	20.04	(75)
Northeast 0.9	× 0.54	X	13.	52	x	67.	96	X	0.24	×	0.7	=	75.02	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	67.	96	X	0.24	x	0.7	=	21.6	(75)
Northeast 0.9	0.77	X	4.′	6	x	67.	96	X	0.24	x	0.7	=	32.91	(75)
Northeast 0.9	0.54	X	13.	52	X	91.	35	X	0.24	X	0.7	=	100.84	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	91.	35	x	0.24	x	0.7	=	29.03	(75)
Northeast 0.9	0.77	X	4.′	6	x	91.	35	X	0.24	x	0.7	=	44.24	(75)
Northeast 0.9	× 0.54	X	13.	52	x	97.	38	X	0.24	x	0.7	=	107.5	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	97.	38	x	0.24	x	0.7	=	30.95	(75)
Northeast 0.9	× 0.77	X	4.′	6	x	97.	38	x	0.24	X	0.7	=	47.17	(75)
Northeast 0.9	× 0.54	X	13.	52	x	91.	.1	X	0.24	x	0.7	=	100.56	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	91.	.1	x	0.24	X	0.7	=	28.96	(75)
Northeast 0.9	× 0.77	X	4.′	6	x	91.	.1	x	0.24	×	0.7	=	44.12	(75)
Northeast 0.9	× 0.54	X	13.	52	x	72.	63	x	0.24	X	0.7	=	80.17	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	72.	63	x	0.24	X	0.7	=	23.08	(75)
Northeast 0.9	× 0.77	X	4.′	6	x	72.	63	x	0.24	×	0.7	=	35.17	(75)
Northeast 0.9	× 0.54	X	13.	52	x	50.	42	x	0.24	X	0.7	=	55.66	(75)
Northeast 0.9	× 0.77	X	2.7	' 3	x	50.	42	x	0.24	x	0.7	=	16.03	(75)
Northeast 0.9	× 0.77	X	4.′	6	x	50.	42	x	0.24	×	0.7	=	24.42	(75)
Northeast 0.9	× 0.54	X	13.	52	x	28.	07	X	0.24	x	0.7	=	30.98	(75)
Northeast 0.9	x 0.77	X	2.7	73	x	28.	07	x	0.24	X	0.7	=	8.92	(75)
Northeast 0.9	v 0.77	X	4.1	6	x	28.	07	x	0.24	X	0.7	=	13.59	(75)
Northeast 0.9	v 0.54	X	13.	52	x	14.	.2	x	0.24	X	0.7	=	15.67	(75)
Northeast 0.9	x 0.77	X	2.7	73	x	14.	.2	x	0.24	X	0.7	=	4.51	(75)

Northeast	0.00		– 1			1			1 1		1	г		_	ſ		7(75)
Northeast		0.77	X	4.1		X		14.2	X	0.24		х <u>Г</u>	0.7	=	= 	6.88	(75)
Northeast		0.54	×	13.5	=	X		9.21	X	0.24		X	0.7	=	= 	10.17	(75)
	<u> </u>	0.77	×	2.7		X		9.21	X	0.24		X	0.7	=	= [2.93	(75)
Northeast		0.77	×	4.1	=	X	!	9.21	X	0.24		X	0.7	_	= 	4.46	(75)
Southeast		0.77	X	3.5	1	X	3	6.79	X	0.24		X	0.7	_	=	15.04	(77)
Southeast		0.77	X	3.5	1	X	6	2.67	X	0.24		X	0.7		= [25.61	(77)
Southeast		0.77	X	3.5	1	X	8	35.75	X	0.24		X	0.7		=	35.04	(77)
Southeast	<u> </u>	0.77	X	3.5	1	X	1	06.25	X	0.24		X	0.7		=	43.42	(77)
Southeast	0.9x	0.77	X	3.5	1	X	1	19.01	X	0.24		X	0.7		= [48.63	(77)
Southeast	0.9x	0.77	X	3.5	1	X	1	18.15	X	0.24		X	0.7		= [48.28	(77)
Southeast	0.9x	0.77	X	3.5	1	X	1	13.91	X	0.24		x	0.7		= [46.55	(77)
Southeast	0.9x	0.77	X	3.5	1	X	1	04.39	X	0.24		X	0.7		= [42.66	(77)
Southeast	0.9x	0.77	X	3.5	1	x	9	2.85	X	0.24		x	0.7		= [37.94	(77)
Southeast	0.9x	0.77	X	3.5	1	X	6	9.27	X	0.24		x	0.7		= [28.31	(77)
Southeast	0.9x	0.77	X	3.5	1	X	4	4.07	x	0.24		x	0.7		= [18.01	(77)
Southeast	0.9x	0.77	X	3.5	1	x	3	1.49	x	0.24		х	0.7		= [12.87	(77)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	3	6.79		0.24		x	0.7		= [32.3	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	6	2.67		0.24		x	0.7		= [55.02	(79)
Southwest	t _{0.9x}	0.77	x	7.5	4	X	8	5.75		0.24		x	0.7		= [75.28	(79)
Southwest	t _{0.9x}	0.77	x	7.5	4	X	1	06.25	j	0.24		x	0.7	ī	= j	93.27	(79)
Southwest	t _{0.9x}	0.77	x	7.5	4	X	1	19.01	j	0.24		x	0.7		= j	104.47	(79)
Southwest	t _{0.9x}	0.77	x	7.5	4	X	1	18.15	j	0.24		х	0.7		- [103.72	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	x	1	13.91		0.24		х	0.7		- [99.99	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	1	04.39	j	0.24		x	0.7		- [91.64	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	9	2.85	j	0.24		x	0.7		<u> </u>	81.51	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	6	9.27	i	0.24		х	0.7	一	= j	60.81	(79)
Southwest	t _{0.9x}	0.77	X	7.5	4	X	4	4.07	i	0.24		х	0.7		=	38.69	(79)
Southwest	t _{0.9x}	0.77	×	7.5	4	X	3	1.49	i	0.24		x	0.7	一	<u> </u>	27.64	(79)
												_			١		
Solar gai	ns in wa	itts, calc	ulated	for each	n month	1			(83)m	i = Sum(74))m(8	82)m					
(83)m= 6	88.84 1	24.4 1	89.19	266.22	327.21	33	37.62	320.19	272	.73 215.	56 1	42.61	83.76	58.0	7		(83)
Total gair	ns — inte	rnal and	solar	(84)m =	(73)m	+ (8	33)m	, watts									
(84)m= 73	31.49 7	82.21 8	21.85	859.4	879.18	8	52.74	814.26	776	.54 742.	.7 7	'09.46	694.55	702.4	ŀ6		(84)
7. Mean	interna	l temper	ature (heating	seasor	า)											
							area	from Tal	ole 9,	Th1 (°C)				[21	(85)
Utilisatio	on factor	for gain	ns for li	ving are	a, h1,n	า (ร	ee Ta	ble 9a)							ı		
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	A	ug Se	ep	Oct	Nov	De	С		
(86)m=	1	0.99	0.99	0.98	0.93	().82	0.66	0.7	'1 0.9		0.98	0.99	1			(86)
Mean in	ternal te	mperati	ıre in l	iving are	ea T1 (f	ollo	w ste	ns 3 to 7	7 in T	able 9c)			•				
			20.02	20.33	20.64	_	0.88	20.97	20.		9 2	20.41	19.99	19.6	6		(87)
` ′		<u> </u>		!				!					1	<u> </u>			
· -			19.87	19.88	19.89	_	eiiing 19.9	19.9	19.	9, Th2 (°C .9 19.8		19.89	19.88	19.8	8 7		(88)
()		· '		. 5.00	. 0.00			L		1 10.0			1	L . 5.5	-		` '

Utilisa	tion fac	tor for a	ains for i	rest of d	welling, l	n2 m (se	e Table	9a)						
(89)m=	1	0.99	0.99	0.96	0.9	0.73	0.52	0.57	0.84	0.97	0.99	1		(89)
Mean	internal	temper	ature in	the rest	of dwelli	na T2 (f	ollow ste	eps 3 to 7	rin Tabl	e 9c)				
(90)m=	18.13	18.3	18.62	19.08	19.51	19.81	19.89	19.88	19.71	19.19	18.6	18.11		(90)
L									f	LA = Livin	g area ÷ (4	1) =	0.15	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwel	lling) = fl	I A × T1	+ (1 – fL	A) x T2					_
(92)m=	18.36	18.52	18.83	19.27	19.68	19.97	20.04	20.04	19.87	19.37	18.8	18.34		(92)
L	adjustn	nent to t	he mear	internal	tempera	ature fro	m Table	4e, whe	ere appro	L opriate				
(93)m=	18.21	18.37	18.68	19.12	19.53	19.82	19.89	19.89	19.72	19.22	18.65	18.19		(93)
8. Spa	ace hea	ting requ	uirement											
				nperatui using Ta		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ו Utilisa			ains, hm					1 1 1 9						
(94)m=	0.99	0.99	0.98	0.95	0.89	0.73	0.52	0.57	0.83	0.96	0.99	0.99		(94)
Usefu	l gains,	hmGm	W = (94	4)m x (84	4)m									
(95)m=	726.03	773.51	805.42	820.54	780.09	619.35	422.75	441.68	613.53	679.63	685.59	698.09		(95)
Month	ıly avera	age exte	rnal tem	perature	from Ta	able 8				•				
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
` ′		1821.35			1041.09	685.54	432.95	457.35	742.35	1146.73	1543.62	1877.66		(97)
Space	heatin	g require	ement fo	r each n		Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m	1		
(98)m=	862.22	704.15	622.87	389.84	194.18	0	0	0	0	347.52	617.78	877.6		_
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	4616.17	(98)
Space	heating	g require	ement in	kWh/m²	?/year								43.09	(99)
9a. Ene	ergy rec	uiremer	nts – Indi	vidual h	eating sy	/stems i	ncluding	micro-C	HP)					
•	e heatir	_										,		_
Fraction	on of sp	ace hea	it from s	econdar	y/supple	mentary	system						0	(201)
Fraction	on of sp	ace hea	it from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fraction	on of to	al heati	ng from	main sys	stem 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Efficie	ncy of r	nain spa	ace heat	ing syste	em 1								89.5	(206)
Efficie	ncy of s	seconda	ry/suppl	ementar	y heating	g system	ո, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space	heatin	g require	ement (c	alculate	d above)									
	862.22	704.15	622.87	389.84	194.18	0	0	0	0	347.52	617.78	877.6		
(211)m	= {[(98])m x (20	4)] } x 1	00 ÷ (20	06)									(211)
	963.38	786.76	695.94	435.58	216.96	0	0	0	0	388.29	690.26	980.56		
_								Tota	l (kWh/yea	ar) =Sum(2	211),,,,5,10,,,,12	=	5157.73	(211)
Space	heating	g fuel (s	econdar	y), kWh/	month							!		_
= {[(98)	m x (20	1)] } x 1	00 ÷ (20	8)										
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
									_		_			_
				Ů					_	ar) =Sum(2	_		0	(215)

Water heating										
Output from water heater (calculated a		454.50	445.04	404.0	100.00	405.05	405.00	1 000 04	1	
215.09 189.58 199.09 177.77 Efficiency of water heater	172.12	151.59	145.24	161.9	163.69	185.05	195.69	209.91	89.5	(216)
(217)m= 89.5 89.5 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	69.5	(217)
Fuel for water heating, kWh/month	00.0	00.0	00.0	00.0	00.0	00.0	00.0	1 00.0		(=)
(219) m = (64) m x $100 \div (217)$ m	, ,								1	
(219)m= 240.33 211.82 222.45 198.63	192.31	169.37	162.27	180.9	182.9	206.77	218.65	234.54		٦
Annual totala				TOla	al = Sum(2		Mbbass	_	2420.93	(219)
Annual totals Space heating fuel used, main system	1					K	Wh/yea	ı	kWh/year 5157.73]
Water heating fuel used									2420.93]
Electricity for pumps, fans and electric	keep-hot	t								_
mechanical ventilation - balanced, ex	tract or p	ositive ir	nput fron	n outsid	е			247.21	1	(230a)
central heating pump:								30	,]	(230c)
Total electricity for the above, kWh/yea	ar			sum	of (230a).	(230g) =			277.21	(231)
Electricity for lighting									420.97	(232)
10a. Fuel costs - individual heating sy	ystems:									
		Fu	ol.			Fuel P	rico		Fuel Cost	
			h/year			(Table			£/year	
			ii, y cai			(10010	12)		~/ y ou!	
Space heating - main system 1			I) x			3.4		x 0.01 =	179.49	(240)
Space heating - main system 1 Space heating - main system 2		(211	•			· .	8	x 0.01 = x 0.01 =		(240)
		(211 (213	I) x			3.4	8		179.49	_
Space heating - main system 2		(211 (213	1) x 3) x 5) x			3.4	19	x 0.01 =	179.49	(241)
Space heating - main system 2 Space heating - secondary		(211 (213 (215	1) x 3) x 5) x			3.4	19	x 0.01 = x 0.01 =	0 0	(241)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to	(230g) se	(21° (21° (21° (21° (23°	1) x 3) x 5) x 9)	licable a	ınd apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 =	0 0 84.25 36.56	(241) (242) (247) (249)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting		(21) (21) (21) (21) (23) (23)	1) x 3) x 5) x 9)	licable a	ınd apply	3.4 0 13. 3.4	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53	(241) (242) (247) (247) (249)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12)	(21) (21) (21) (23) (23) (23)	1) x 3) x 5) x 9) 1) y as app	licable a	ind apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	0 0 84.25 36.56	(241) (242) (247) (249)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a) and (254)	(21) (21) (21) (21) (23) eparately (23)	1) x 3) x 5) x 9) 1) 7 as app		ınd apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120](241)](242)](247)](249)](250)](251)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost) and (254) (245)(:	(21) (21) (21) (21) (23) eparately (23)	1) x 3) x 5) x 9) 1) y as app		ınd apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53	(241) (242) (247) (247) (249)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s) and (254) (245)(:	(21) (21) (21) (21) (23) eparately (23)	1) x 3) x 5) x 9) 1) 7 as app		ind apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120	(241) (242) (247) (249) (250) (251) (255)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s Energy cost deflator (Table 12)) and (254) (245)(; ystems	(211 (213 (215 (232 eparately (232 as need (247) + (25	1) x 3) x 5) x 9) 1) 7 as appl 22)	=	and apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120	(241) (242) (247) (249) (250) (251) (255)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s Energy cost deflator (Table 12) Energy cost factor (ECF)) and (254) (245)(; ystems	(211 (213 (215 (232 eparately (232 as need (247) + (25	1) x 3) x 5) x 9) 1) 7 as app	=	ind apply	3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120	(241) (242) (247) (249) (250) (251) (255) (256) (257)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (Section 12)) and (254) (245)(: ystems [(255) x	(211 (213 (215 (219 (232 eparately (232 as need (247) + (25	ded 60)(254)	=		3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120 475.83	(241) (242) (247) (249) (250) (251) (255)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s Energy cost deflator (Table 12) Energy cost factor (ECF)) and (254) (245)(: ystems [(255) x	(211 (213 (215 (219 (232 eparately (232 as need (247) + (25	ded 60)(254)	=		3.4 0 13. 3.4 13. 7 fuel pri	19 19 19 19	x = 0.01 = 0.001 = 0	179.49 0 84.25 36.56 Table 12a 55.53 120 475.83	(241) (242) (247) (249) (250) (251) (255) (256) (257)
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 12 Appendix Q items: repeat lines (253) a Total energy cost 11a. SAP rating - individual heating s Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (Section 12)) and (254) (245)(: ystems [(255) x	(213 (215 (215 (233 (233) eparately (232) as need (247) + (25) (256)] ÷ [(ded 60)(254)	=		3.4 0 13. 3.4 13. / fuel price 13.	19 19 19 19 19 19 19 19 19 19 19 19 19 1	x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to x 0.01 =	179.49 0 84.25 36.56 Table 12a 55.53 120 475.83	(241) (242) (247) (249) (250) (251) (255) (256) (257) (258)

Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	522.92 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1636.99 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	143.87 (267)
Electricity for lighting	(232) x	0.519 =	218.48 (268)
Total CO2, kg/year	sum	of (265)(271) =	1999.35 (272)
CO2 emissions per m²	(272	(a) ÷ (4) =	18.66 (273)
El rating (section 14)			82 (274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	6292.43 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2953.54 (264)
Space and water heating	(261) + (262) + (263) + (264) =		9245.97 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	851.02 (267)
Electricity for lighting	(232) x	0 =	1292.39 (268)
'Total Primary Energy	sur	n of (265)(271) =	11389.38 (272)
Primary energy kWh/m²/year	(27	2) ÷ (4) =	106.3 (273)

			Use	r Details:						
Assessor Name:	Chris Hock	-			a Num				016363	
Software Name:	Stroma FS	AP 2012			are Ve			Versio	n: 1.0.4.10	
Address .			Proper	ty Address	s: Flat 0-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:									
1. Overall awelling aim	C11310113.		Α	rea(m²)		Av. He	ight(m)		Volume(m³	3)
Basement				43.37	(1a) x		3.1	(2a) =	134.45	(3a)
Ground floor				66.91	(1b) x	2	2.6	(2b) =	173.97	(3b)
Total floor area TFA = (1	1a)+(1b)+(1c)+	(1d)+(1e)+	(1n)	110.28	(4)			_		_
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:										
	main heating	second heatin		other		total			m³ per hou	r
Number of chimneys	0	+ 0	+	0	= [0	X e	40 =	0	(6a)
Number of open flues	0	+ 0	+	0	= [0	x	20 =	0	(6b)
Number of intermittent fa	ans					0	X	10 =	0	(7a)
Number of passive vents	S				Ī	0	X	10 =	0	(7b)
Number of flueless gas f	fires				Ī	0	X 4	40 =	0	(7c)
					_					<u> </u>
					_			Air cn	nanges per ho	our —
Infiltration due to chimne	•					0		÷ (5) =	0	(8)
If a pressurisation test has Number of storeys in t		•	ceea to (17	r), otnerwise	continue ti	om (9) to ((16)		0	(9)
Additional infiltration	ine aweiling (in	3)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel o	r timber frame	or 0.35	for mason	rv consti	uction	1(0)	.,,	0	(11)
if both types of wall are p					•					` ′
deducting areas of open	• /		. 0 1 /00	مامیا امی	antar 0					¬,,,,
If suspended wooden If no draught lobby, er		,	1 U.1 (Se	aled), eise	enter o				0	(12)
Percentage of window	•		4						0	(13)
Window infiltration	is and doors di	augiii sirippe	u	0.25 - [0.	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate				_	+ (11) + (*	_	+ (15) =		0	(16)
Air permeability value	. a50. expresse	ed in cubic me	tres per					area	3	(17)
If based on air permeab	•		•	•	•				0.15	(18)
Air permeability value appli	•					is being us	sed			 ` ′
Number of sides shelter	ed								3	(19)
Shelter factor				(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ating shelter fac	ctor		(21) = (18	3) x (20) =				0.12	(21)
Infiltration rate modified	for monthly wir	nd speed						,	1	
Jan Feb	Mar Apr	May Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Tabl	e 7								
(22)m = 5.1 5	40 44	42 20	2.0	2.7	1 4	4.2	1.5	17	l	

4.3

3.8

3.8

3.7

4.5

4.7

Wind Factor (22a)m = (22)n	n ÷ 4									
(22a)m= 1.27 1.25 1.25		.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (all	uving for shalt	or and wind a		(21a) v ((22a)m	!		<u>. </u>	l	
Adjusted infiltration rate (allo		.12 0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air chang		l l	1	0.11	0.12	0.12	0.10	0.11		
If mechanical ventilation:									0.5	(23a)
If exhaust air heat pump using A) = (23a)			0.5	(23b)
If balanced with heat recovery:	•	•	,	·		Ola)	001.) [(00-)	76.5	(23c)
a) If balanced mechanica (24a)m= 0.27 0.26 0.20		n neat recov .24 0.23	ery (MV)	HR) (24a _{0.23}	m = (2) 0.23	2b)m + (2 0.24	23b) x [²	0.25	÷ 100] 	(24a)
b) If balanced mechanica		l	ļ	LI				0.23		(244)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 0		0	0	0	0	0	0		(24b)
c) If whole house extract				ا	utside					, ,
if $(22b)m < 0.5 \times (23b)$	-	-				.5 × (23b)			
(24c)m= 0 0 0	0	0 0	0	0	0	0	0	0		(24c)
d) If natural ventilation or										
if $(22b)m = 1$, then $(24b)m = 1$				- ``						(244)
(24d)m= 0 0 0	0	0 0	0	0	0 (05)	0	0	0		(24d)
Effective air change rate - (25)m= 0.27 0.26 0.20		.24 0.23	c) or (24 0.23	0.23	0.23	0.24	0.25	0.25		(25)
(20)111- 0.27 0.20 0.20	0.20 0	0.20	0.20	0.20	0.20	0.24	0.20	0.20		(=3)
3. Heat losses and heat los	·	N 1 4 A				A 3/11				A 3/ 1
3. Heat losses and heat los ELEMENT Gross area (m²)	os parameter: Openings m²	Net Ar A ,ı		U-valu W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gross	Openings						<)			
ELEMENT Gross area (m²)	Openings	, A	m ²	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Openings	A ,ı	m² x 2 x ¹ / ₂	W/m2	K = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,1 2.6	m ² x 2 x ¹ / ₃ x 1/ ₄	W/m2 1.2 /[1/(1.2)+	K = 0.04] = 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	2.6 13.52 2.73	m ² x 2 x ¹ / ₃ x ¹ / ₃ x ¹ / ₃	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	K = 0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,1 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Openings	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 3.2	Openings m² 34.06	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3	Openings m² 34.06 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79 3.2 43.03	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Floor Type 1 Second Secon	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79 3.2 43.00 28.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99 10.55	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

Party of	eilina					62.16					Г		-	(32b)
-	•	roof winde	ows, use e	effective wi	ndow U-va			ı formula 1,	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		(02.5)
					ls and part					, -	-			
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	- TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•		ere the de tailed calci		constructi	ion are not	known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
					using Ap	nendix k	<					I	37.2	(36)
	•	,	,		= 0.15 x (3	•	•					l	51.2	(00)
	abric he								(33) +	(36) =			108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		
			\								Sum(39) ₁ .	12 /12=	133.41	(39)
			HLP), W	ı —						= (39)m ÷				
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22	4.04	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	average =	Sum(40) ₁ .	12 / 12=	1.21	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
(41)m= 31 28 31 30 31 30 31 30 31 30 31 (41)														
								I						
4. Wa	iter heat	ing enei	rgy requi	irement:								kWh/ye	ear:	
				irement:									ear:	(10)
Assum	ied occu	ıpancy, İ	N		(-0.0003	349 x (TF	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ıpancy, İ	N		(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.			ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	[1 - exp	es per da	ıy Vd,av	erage =	(25 x N)	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	[1 - exp ge in litre usage by		ay Vd,av	erage = designed t	(25 x N)	+ 36		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per l	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,avelwelling is	erage = designed ((25 x N) to achieve	+ 36 a water us	se target o	9) 10°	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the o	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ear 103.11	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2	par:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ear 103.11	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) 10 ² Nov	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ear 103.11	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by a day (all w Apr ach month 99.07 culated me	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	1.09 Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	Ined occurrence of A > 13.9 If A £ 13.9 If average the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of the annual of that 125 If average in the annual of the annual	ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy ipan	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83	[1 - exp ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave lwelling is not and co. Jun ctor from T 90.98 190 x Vd,r 107.44	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46)	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Fotal = Su 134.73 Fotal = Su	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by a day (all w Apr ach month 99.07 culated me	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave welling is not and co. Jun ctor from 7 90.98 190 x Vd,r 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56 enter 0 in 14.93	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 103.11 used - cal 148.83 ang at point 22.32 includir	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46	es per da 5% if the of	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9	ppancy, I p, N = 1 p, N = 1 e hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,ave welling is not and co. Jun go.98 190 x Vd,r. 107.44 storage), 16.12 /WHRS nter 110	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ag any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46) (47)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Otherv Water a) If m	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ng any so ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fac 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) = 0$ (50)
b) If manufacturer's declared cylinder loss factor is not known	
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3	0 (51)
Volume factor from Table 2a	0 (52)
Temperature factor from Table 2b	0 (53)
Energy lost from water storage, kWh/year	$(47) \times (51) \times (52) \times (53) = 0 \tag{54}$
Enter (50) or (54) in (55)	0 (55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$
(56)m= 0 0 0 0 0 0	0 0 0 0 0 (56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m where (H11) is from Appendix H
(57)m= 0 0 0 0 0 0	0 0 0 0 0 (57)
Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss calculated for each month (59)m = (58) ÷	365 × (41)m
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder thermostat)
(59)m= 0 0 0 0 0 0	0 0 0 0 (59)
Combi loss calculated for each month (61)m = (60) \div 365 × (4	1)m
(61)m= 50.96 46.03 50.96 48.86 48.42 44.87 46.36	48.42 48.86 50.96 49.32 50.96 (61)
Total heat required for water heating calculated for each mon	$h (62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$
(62)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	
Solar DHW input calculated using Appendix G or Appendix H (negative quar	ity) (enter '0' if no solar contribution to water heating)
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)
(63)m= 0 0 0 0 0 0	0 0 0 0 0 (63)
Output from water heater	
(64)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	2 162.67 164.46 185.69 196.38 210.66
	Output from water heater (annual) ₁₁₂ 2175.54 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45]	m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]
(65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69	50.09 50.65 57.54 61.23 65.84 (65)
include (57)m in calculation of (65)m only if cylinder is in the	e dwelling or hot water is from community heating
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec
(66)m= 168.99 168.99 168.99 168.99 168.99 168.99 168.99	0 168.99 168.99 168.99 168.99 168.99 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a)	also see Table 5
(67)m= 60.61 53.84 43.78 33.15 24.78 20.92 22.6	29.38 39.43 50.07 58.44 62.3 (67)
Appliances gains (calculated in Appendix L, equation L13 or I	13a), also see Table 5
(68)m= 405.91 410.12 399.5 376.91 348.38 321.58 303.6	7 299.45 310.07 332.66 361.19 388 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15	a), also see Table 5
(69)m= 54.72 54.72 54.72 54.72 54.72 54.72 54.72	54.72 54.72 54.72 54.72 (69)
Pumps and fans gains (Table 5a)	
(70)m= 3 3 3 3 3 3 3	3 3 3 3 (70)
Losses e.g. evaporation (negative values) (Table 5)	· · · · · · · · · · · · · · · · · · ·
(71)m= -112.66 -112.66 -112.66 -112.66 -112.66 -112.66 -112.66	6 -112.66 -112.66 -112.66 -112.66 (71)

Water heati	ng gains (T	able 5)												
(72)m= 90.8		83.64	76.89	71.91	6	5.19	60.07	67.	33 70.35	77.33	85.04	88.5		(72)
Total interi	nal gains =	 :		ļ		(66)	m + (67)m	+ (68	3)m + (69)m + (70)m +	(71)m + (72)	m	l	
(73)m= 671.		640.97	600.99	559.12	52	21.73	500.39	510	.21 533.9	574.1	1 618.71	652.84		(73)
6. Solar ga	ains:													
		using sola	flux from	Table 6a	and	associ	ated equa	tions	to convert to th	e applic	able orientat	ion.		
Orientation		actor	Area			Flu			g_		FF		Gains	
	Table 6d		m²			Tal	ole 6a		Table 6b		Table 6c		(W)	
Northeast 0.9	0.54	X	13.	52	x	1	1.28	x	0.24	X	0.7	=	12.46	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	1	1.28	x	0.24	X	0.7	=	3.59	(75)
Northeast 0.9	9x 0.77	X	4.1	6	x	1	1.28	x	0.24	×	0.7	=	5.46	(75)
Northeast 0.9	0.54	X	13.	52	x	2	2.97	x	0.24	×	0.7	=	25.35	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	2	2.97	x	0.24	x	0.7	=	7.3	(75)
Northeast 0.9	9x 0.77	X	4.1	6	x	2	2.97	x	0.24	×	0.7	=	11.12	(75)
Northeast 0.9	0.54	Х	13.	52	X	4	1.38	x	0.24	x	0.7	=	45.68	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	4	1.38	x	0.24	x	0.7	=	13.15	(75)
Northeast 0.9	0.77	Х	4.1	16	x	4	1.38	x	0.24	x	0.7	=	20.04	(75)
Northeast 0.9	0.54	Х	13.	52	X	6	7.96	x	0.24	x	0.7	=	75.02	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	6	7.96	x	0.24	x	0.7	=	21.6	(75)
Northeast 0.9	0.77	x	4.1	6	x	6	7.96	x	0.24	×	0.7	=	32.91	(75)
Northeast 0.9	0.54	X	13.	52	x	9	1.35	x	0.24	×	0.7	=	100.84	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	9	1.35	x	0.24	x	0.7	=	29.03	(75)
Northeast 0.9	0.77	X	4.1	6	x	9	1.35	x	0.24	×	0.7	=	44.24	(75)
Northeast 0.9	0.54	X	13.	52	x	9	7.38	x	0.24	x	0.7	=	107.5	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	9	7.38	x	0.24	x	0.7	=	30.95	(75)
Northeast 0.9	0.77	х	4.1	6	x	9	7.38	x	0.24	x	0.7	=	47.17	(75)
Northeast 0.9	0.54	X	13.	52	x	(91.1	x	0.24	x	0.7	=	100.56	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	Ç	91.1	x	0.24	x	0.7	=	28.96	(75)
Northeast 0.9	0.77	х	4.1	6	x	ý	91.1	x	0.24	x	0.7	=	44.12	(75)
Northeast 0.9	0.54	х	13.	52	x	7	2.63	x	0.24	x	0.7	=	80.17	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	7	2.63	x	0.24	x	0.7	=	23.08	(75)
Northeast 0.9	0.77	х	4.1	6	x	7	2.63	x	0.24	x	0.7	=	35.17	(75)
Northeast 0.9	0.54	x	13.	52	x	5	0.42	x	0.24	×	0.7		55.66	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	5	0.42	x	0.24	×	0.7	=	16.03	(75)
Northeast 0.9	0.77	x	4.1	6	x	5	0.42	x	0.24	×	0.7		24.42	(75)
Northeast 0.9	0.54	X	13.	52	x	2	8.07	x	0.24	×	0.7	=	30.98	(75)
Northeast 0.9	0.77	х	2.7	' 3	x	2	8.07	x	0.24	x	0.7	=	8.92	(75)
Northeast 0.9	0.77	х	4.1	6	x	2	8.07	x	0.24	X	0.7	=	13.59	(75)
Northeast 0.9		х	13.	52	x	,	14.2	x	0.24	X	0.7	=	15.67	(75)
Northeast 0.9	9x 0.77	x	2.7	' 3	x		14.2	x	0.24	X	0.7	=	4.51	(75)

Northeast _{0.9x}	0.77	— ,	440	_	, 	440	1 ,	0.04	–	0.7	_ _	0.00	(75)
Northeast 0.9x	0.77	X	4.16	_	×	14.2] X]	0.24	X	0.7	_ =	6.88	(75)
<u>L</u>	0.54	×	13.52	_	×	9.21	J X	0.24	X	0.7	_ =	10.17	(75)
Northeast 0.9x	0.77	X	2.73	=	×	9.21	」 X ∃	0.24	×	0.7	=	2.93	(75)
Northeast _{0.9x}	0.77	×	4.16	_	×	9.21	X	0.24	×	0.7	=	4.46	(75)
Southwest _{0.9x}	0.77	Х	7.54	_	x	36.79	<u> </u>	0.24	X	0.7	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.54		X	62.67]	0.24	X	0.7	=	55.02	(79)
Southwest _{0.9x}	0.77	X	7.54		X	85.75	<u> </u>	0.24	X	0.7	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.54		X	106.25]	0.24	X	0.7	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.54		х	119.01]	0.24	X	0.7	=	104.47	(79)
Southwest _{0.9x}	0.77	X	7.54		x	118.15]	0.24	X	0.7	=	103.72	(79)
Southwest _{0.9x}	0.77	X	7.54		X	113.91]	0.24	X	0.7	=	99.99	(79)
Southwest _{0.9x}	0.77	X	7.54		x	104.39]	0.24	x	0.7	=	91.64	(79)
Southwest _{0.9x}	0.77	X	7.54		x	92.85		0.24	х	0.7	=	81.51	(79)
Southwest _{0.9x}	0.77	x	7.54		х	69.27	Ī	0.24	x	0.7		60.81	(79)
Southwest _{0.9x}	0.77	x	7.54		х	44.07	ĺ	0.24	x	0.7	=	38.69	(79)
Southwest _{0.9x}	0.77	x	7.54		х 🗔	31.49	j .	0.24	x	0.7		27.64	(79)
Northwest _{0.9x}	0.77	x	3.51		x	11.28	j x	0.24	x	0.7	_ =	4.61	(81)
Northwest 0.9x	0.77	x	3.51		x 🔚	22.97	X	0.24	x	0.7	=	9.39	(81)
Northwest 0.9x	0.77	x	3.51		x	41.38] x	0.24	×	0.7		16.91	(81)
Northwest 0.9x	0.77	×	3.51	\exists	x 🗀	67.96] X	0.24	= x	0.7	-	27.77	(81)
Northwest 0.9x	0.77	×	3.51	=	x 📙	91.35]]	0.24	- x	0.7	=	37.33	(81)
Northwest _{0.9x}	0.77	x	3.51	=	x -	97.38]]	0.24	x	0.7	= =	39.8	(81)
Northwest 0.9x	0.77		3.51	=	x	91.1]	0.24		0.7		37.23	(81)
Northwest 0.9x	0.77		3.51	_	x	72.63]	0.24	_	0.7		29.68	(81)
Northwest 0.9x		=		=			1		≓ ¦		=		(81)
Northwest 0.9x	0.77	×	3.51	_	×	50.42	」× 1、	0.24	×	0.7	╡ -	20.6	(81)
Northwest 0.9x	0.77	x	3.51	_	×	28.07] X]	0.24	_ X	0.7	=	11.47	= ` '
Northwest 0.9x	0.77	×	3.51	=	×	14.2	X	0.24	×	0.7	=	5.8	(81)
Northwest 0.9x	0.77	X	3.51		x	9.21	X	0.24	X	0.7	=	3.77	(81)
Calan mains in			fa., a., ala				(00)	0(74)	(00)				
Solar gains in (83)m= 58.42		171.06		<u>10ntn</u> 15.91	329.13	310.86	(83)m 259	.75 198.22	(82)m 125.77	71.55	48.97		(83)
Total gains – i							200	.70 130.22	120.77	71.00	40.57		(55)
(84)m= 729.8		812.03	<u>` </u>	75.03	850.86		769	.95 732.12	699.89	690.26	701.81]	(84)
` '						1	1	1 1 1 1 1 1		1	1		
7. Mean inter							LI- 0	Th4 (00)					7(05)
Temperature	•	٠.			_		bie 9	, Int (°C)				21	(85)
Utilisation fac	 -				<u> </u>		T .		1 0.1	T NI.		1	
Jan	Feb	Mar		May	Jun	Jul	+	ug Sep	Oct	+	Dec		(06)
(86)m= 1	1	0.99	0.98	0.94	0.83	0.67	0.7	72 0.91	0.98	0.99	1		(86)
Mean interna						-i	7 in T	able 9c)	1			1	
(87)m= 19.71	19.82	20.03	20.34 2	0.65	20.88	20.97	20.	96 20.79	20.41	20.01	19.69		(87)
Temperature	during he	ating pe	eriods in re	est of	<u>dwe</u> llin	g from Ta	able 9	9, Th2 (°C)				_	
(88)m= 19.9	19.9	19.9	19.91 1	9.91	19.92	19.92	19.	93 19.92	19.91	19.91	19.91		(88)
			•			-	•	-		-		•	

Litiliooti	ion foo	tor for a	oine for	root of d	vallina k	2 m (ac	o Tabla	00)						
(89)m=	1	0.99	0.99	0.97	welling, h	0.74	0.53	9a) 0.58	0.85	0.97	0.99	1		(89)
					<u> </u>		<u> </u>				0.99	'		(00)
_	nternal	temper	18.66	the rest	of dwelli	ng 12 (fo	ollow ste	ps 3 to 19.91	/ In Tabl	e 9c) 19.22	18.64	18.17		(90)
(90)m=	16.19	16.33	10.00	19.12	19.54	19.04	19.91	19.91		LA = Livin	!	ļ	0.14	(90)
										L/(- L/VIII	g aroa . (-	,, –	0.14	(91)
	T		<u>`</u>		ole dwel		r	_	_			ı 1	l	4
(92)m=	18.4	18.56	18.86	19.29	19.7	19.98	20.06	20.05	19.89	19.39	18.83	18.38	I	(92)
· · · · · · -			i —		tempera					·				(00)
` /	18.25	18.41	18.71	19.14	19.55	19.83	19.91	19.9	19.74	19.24	18.68	18.23		(93)
		·	uirement				44 (T	41	. 	70)		1.	
				mperatui using Ta		ed at ste	ep 11 of	l able 9i	o, so tha	t II,m=(/6)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisati			ains, hm	1:						•	•		1	
(94)m=	0.99	0.99	0.98	0.96	0.89	0.73	0.53	0.58	0.84	0.96	0.99	0.99		(94)
			<u>`</u> _	4)m x (84	·								l	
(95)m=	725	767.19	797.81	816.58	781.55	623.34	426.05	444.74	612.64	673.65	682.4	697.96		(95)
				·	from Ta							1		(00)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	I	(96)
					erature, l		- ` 	- ,	<u> </u>	-	4540.0	4005 54		(07)
` ′		1827.01			1045.34	689.42	436.08	460.54	745.62	1150.73	1549.8	1885.51	ı	(97)
	868.03	712.2	632.03	396.08	nonth, kV	0	$\ln = 0.02$	4 X [(97))m – (95 0	354.95	624.53	883.54		
(90)111= [1	000.03	712.2	032.03	390.00	190.20	0				<u> </u>		L	4667.62	(98)
Space	hooting	a roquir	omont in	kWh/m²	l/voor			Tota	l per year	(Kvvn/year) = Sum(9	0)15,912 =](98)](99)
	· ·	• •			•							l	42.33	
9a. Ener			nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					
Space Fraction		_	nt from s	econdar	y/supple	mentary	svstem					ı	0	(201)
	•			nain syst		····o···tai y	•	(202) = 1 -	- (201) =			ļ	1	(202)
	•			main sys	` ,			(204) = (2	02) × [1 –	(203)] =			1	(204)
			•	ing syste				, , ,	, .	` '-			89.5	(206)
	•	•		0 ,	y heating	svstem	າ. %						0	(208)
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	
∟ Space			l		d above)		l ou.	7109	ООР	00.	1101		,0	ω.
· -	868.03	712.2	632.03	396.08	196.26	0	0	0	0	354.95	624.53	883.54		
ــ = (211)m	= {[(38)	m x (20	L 4) } x 1	00 ÷ (20								<u> </u>		(211)
·	969.87	795.75	706.18	442.55	219.29	0	0	0	0	396.59	697.8	987.2		(=)
L	ļ								l (kWh/yea	I ar) =Sum(2	<u>l</u> 211) _{1 510 12}	<u> </u> =	5215.22	(211)
Snace	heating	a fuel (e	econdar	y), kWh/	month				•	`	10,1012	l		」 ` ′
= {[(98)n	7	• ,		• •										
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
<u> </u>					· !			Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
												·		_

Water heating Output from water heater (calculated al	hove)									
215.87 190.26 199.79 178.61	172.93	152.3	145.92	162.67	164.46	185.69	196.38	210.66]	
Efficiency of water heater			•	•	•	•	•	•	89.5	(21
(217)m= 89.5 89.5 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(21
Fuel for water heating, kWh/month										
(219) m = (64) m x $100 \div (217)$ m (219)m= 241.19 212.58 223.23 199.57	193.22	170.17	163.04	181.75	183.76	207.47	219.42	235.38]	
				Tota	al = Sum(2	19a) ₁₁₂ =	l		2430.77	(21
Annual totals						k\	Wh/yea	r	kWh/year	_
Space heating fuel used, main system	1								5215.22	
Water heating fuel used									2430.77	
Electricity for pumps, fans and electric	keep-ho	t								
mechanical ventilation - balanced, ext	ract or p	ositive i	nput fror	n outsid	е			253.98]	(23
central heating pump:								30		(23
Total electricity for the above, kWh/yea	ır			sum	of (230a).	(230g) =			283.98	(23
Electricity for lighting									428.18	」 │ ₍₂₃
10a. Fuel costs - individual heating sy	stems:									<u></u> ,
rear racresces marriaga, nearing of	otorrio.	_	_							
		Fu kW	el /h/year			Fuel P (Table			Fuel Cost £/year	
Space heating - main system 1		(21	1) x			3.4	8	x 0.01 =	181.49	(24
Space heating - main system 2		(213	3) x			0		x 0.01 =	0	(24
Space heating - secondary		(21	5) x			13.	19	x 0.01 =	0	(24
Water heating cost (other fuel)		(219	9)			3.4	8	x 0.01 =	84.59	(24
Pumps, fans and electric keep-hot		(23	1)			13.	19	x 0.01 =	37.46	_] ₍₂₄
(if off-peak tariff, list each of (230a) to (Energy for lighting	230g) se	eparately (23)		licable a	and apply	fuel pri		rding to x 0.01 =	Table 12a 56.48	ー 기(25
Additional standing charges (Table 12)									120	」` □(25
										٦,
Appendix Q items: repeat lines (253) a Total energy cost	, ,		ded 50)(254)	_					480.01	(25
11a. SAP rating - individual heating sy		247) 1 (20)(20 4)	_					460.01](20
<u> </u>	/Sterris									
Energy cost deflator (Table 12)									0.42	(25
Energy cost factor (ECF)	[(255) x	(256)] ÷ [((4) + 45.0]	=					1.3	(25
SAP rating (Section 12)									81.89	(25
12a. CO2 emissions – Individual heati	ing syste	ems inclu	uding mi	cro-CHF						
			ergy /h/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	

Space heating (secondary)	(215) x	0.519 =	0 (26	63)
Water heating	(219) x	0.216 =	525.05 (26	64)
Space and water heating	(261) + (262) + (263) + (264) =		1651.53 (26	65)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	147.38 (26	67)
Electricity for lighting	(232) x	0.519 =	222.22 (26	68)
Total CO2, kg/year	sum	of (265)(271) =	2021.14 (27	72)
CO2 emissions per m ²	(272	2) ÷ (4) =	18.33 (27	73)
El rating (section 14)			83 (27	74)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	6362.57 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2965.54 (264)
Space and water heating	(261) + (262) + (263) + (264) =		9328.11 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	871.81 (267)
Electricity for lighting	(232) x	0 =	1314.51 (268)
'Total Primary Energy	sum	n of (265)(271) =	11514.43 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	104.41 (273)

Stroma Name: Chris Hocknell Stroma FSAP 2012 Stroma Number: STR0016363 Version: 1.0.4.10					User [Details:						
## Address: 1. Overall dwelling dimensions: Area(m²)		ame: Chris Hocknell					Stroma Number: STRO					
Area(m²) Av. Height(m) Volume(m³) 192.56 (38)				Р	roperty	Address	: Flat 1-1	1-Lean				
Avalage		anaiana										
Basement 74.06 (1a) x 2.6 (2a) 192.56 (3a)	1. Overall dwelling dim	iensions:			Δτο	a(m²)		Δv Hai	iaht(m)		Volume(m³)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Dwelling volume	Basement					<u> </u>	(1a) x			(2a) =	· · ·	_
Dwelling volume	Total floor area TFA = (1a)+(1b)+(1c)-	+(1d)+(1e	·)+(1r	n)]`		``
Number of chimneys		-, (-, (-,	(-) (-	, (′ <u> </u>	1.00)+(3c)+(3d	l)+(3e)+	.(3n) =	102.56	7(5)
Number of chimneys	_						(33) (33)	,	,, (00)		192.56	
Number of chimneys	2. Ventilation rate:	main	S	econdar	у	other		total			m³ per hour	•
Number of open flues 0 + 0 + 0 + 0 = 0 x20 = 0 (6b) Number of intermittent fans 0 x10 = 0 (7b) Number of passive vents 0 x10 = 0 (7b) Number of passive vents 0 x10 = 0 (7b) Number of flueless gas fires 0 x40 = 0 (7c) Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0 + (5) = 0 (8) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction If both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 O (12) If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 · (0.2 × (14) + 100) = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3. (17) If based on air permeability value, then (18) = ((17) + 20)+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sictors (20) = 1 · [0.075 × (19)] = 0.85 C2) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	Number of chimneys				П + Г		7 ₌ F		x 4	40 =	-	_
Number of intermittent fans 0	•		⊣ ⊨		_		╛╘		x :	20 =		╡
Number of passive vents 0	·		` L		J L		J					╡
Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							Ļ					╣
Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	·						Ļ	0			0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0	Number of flueless gas	fires						0	X 4	40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0										Air ch	anges per ho	ur
Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 Quite 1 (a) (10) Percentage of windows and doors draught stripped Window infiltration Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec [9) (9) (10) (10) (11) (11) (12) (13) (14) (14) (14) (15) = 0 (16) (16) (17) (18) (19) (19) (10) (11) (10) (11) (11) (12) (13) (14) (14) (14) (15) = 0 (16) (16) (17) (18) (19) (19) (19) (19) (10) (10) (11) (11) (11) (12) (13) (14) (14) (14) (15) = 0 (16) (16) (17) (18) (19) (19) (19) (19) (10) (10) (11) (11) (11) (12) (13) (14) (14) (14) (14) (14) (15) = 0 (16) (16) (16) (17) (19) (19) (19) (10) (10) (11) (11) (12) (13) (14) (15) = 0 (16) (16) (16) (16) (17) (18) (19) (19) (19) (10) (11) (11) (12) (13) (14) (Infiltration due to chimn	evs flues and	fans = (6	a)+(6b)+(7	7a)+(7b)+	(7c) =	Г					_
Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration October 1.5 (a) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7		•					continue fr			. (3) =	0	(0)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 O (12) If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) ÷ 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	Number of storeys in	the dwelling (r	ıs)								0	(9)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ÷ 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.85 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	Additional infiltration								[(9)-	-1]x0.1 =	0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration Infiltration rate Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = Dan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7							•	uction			0	(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration Outside the following of the f	• •	•		ponding to	the grea	ter wall are	a (after					
Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ O (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ O (14) O (15) (16) O (17) O (18) O (19) O (19) O (19) O (19) O (19) O (19) O (10)											0	(12)
Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area $(17) \div (17) \div (17) \div (18) \div (18) = (16)$ (18) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered $(20) = 1 - [0.075 \times (19)] = 0.85$ (20) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.13$ (21) Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7										0	(13)	
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7	Percentage of windows and doors draught stripped									0	(14)	
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = Infiltration rate incorporating shelter factor (21) = (18) × (20) = Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	Window infiltration $0.25 - [0.2 \times (14) \div 100] =$									0	(15)	
If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7										0	(16)	
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7										3	(17)	
Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] =	•							is baing	aad		0.15	(18)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7			ion test nas	s been dor	ie oi a ue	gree air pe	ппеаышу	is being us	seu		2	7(19)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7											⊣ ``	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	Infiltration rate incorporating shelter factor (21) = (18) x (20) =									0.13	(21)	
Monthly average wind speed from Table 7	Infiltration rate modified	for monthly wi	nd speed	l								_
	Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	Monthly average wind s	peed from Tak	ole 7									
	(22)m= 5.1 5	4.9 4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Footor (22a)m - (22)m : 4	Wind Easter (22a) (
Wind Factor $(22a)m = (22)m \div 4$ $(22a)m = 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18$			1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1	
Calculate effec		•	rate for t	he appli	cable ca	se	!	1	!	!	1	J	
If mechanical ventilation:										0.5	(23a)		
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =) = (23a)			0.5	(23b)	
		-	-	_					Ola) (001.)	4 (00)	76.5	(23c)
a) If balance	0.28	anical ve	ntilation 0.26	0.25	at recove	ery (MVI 0.24	TR) (248	a)m = (22) 0.24	, 		$\frac{1 - (23c)}{0.27}$) ÷ 100] 1	(24a)
(24a)m= 0.28					<u> </u>			ļ	0.25	0.26	0.27	J	(2 4 a)
b) If balance	a mecha 0	o o	ntilation	without 0	neat red		0	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	2b)m + (.	230)	0	1	(24b)
c) If whole ho					<u> </u>							J	(210)
if (22b)m				•	•				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24c)
d) If natural v	ventilatio	on or wh	ole hous	e positiv	re input	ventilatio	on from	loft			!	J	
if (22b)m					•				0.5]			_	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24d)
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)				_	
(25)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(25)
3. Heat losses	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m².		A X k kJ/K
Doors		` /			2.6	x	1.2		3.12	<u></u>			(26)
Windows Type	1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	Ħ			(27)
Windows Type	2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	3				5.51	x1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type 4				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								(27)	
Floor					14.69) x	0.11	— ;i	1.6159	<u> </u>			(28)
Walls Type1	67.7	·8	20.58	3	47.2	=	0.15	╡┇	7.08	=		7 -	(29)
Walls Type2 24.47 2.6				21.87 x 0.15 = 3.28						- -	(29)		
Walls Type3	5.93		0	=	5.93	=	0.15	╡┇	0.89	=		7	(29)
Total area of el					112.8	=							(31)
Party wall		,			12.38	=	0		0	— [\neg	(32)
Party floor					59.37	=						-	(32a)
Party ceiling					74.06	=						7	(32b)
* for windows and * ** include the area					alue calcui		formula 1	1/[(1/U-valu	ıe)+0.04] á	L as given in	paragrapl	 h 3.2	(*- */
	Fabric heat loss, W/K = S (A x U)					(26)(30) + (32) =						39.55	(33)
Heat capacity (,	•		((28)(30) + (32) + (32a)(32e) =						(32e) =	27754.9	
Thermal mass	•		P = Cm ÷	- TFA) ir	n kJ/m²K	,	Indicative Value: Medium						(35)
For design assessican be used instea				construct	ion are no	t known pi	ecisely the	e indicative	e values of	TMP in T	able 1f	250	
	Thermal bridges: S (L x Y) calculated using Appendix K									18.19	(36)		

			are not kn	own (36) =	= 0.15 x (3	1)								_
Total fa									` '	(36) =			57.74	(37)
Ventilat				l monthly					` ′	·	25)m x (5)			
(2.2)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		_
Heat los	ss parar	meter (H	ILP), W/	′m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	74.07	(39)
(40)m=	1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01		
_	•									Average =	Sum(40) ₁ .	12 /12=	1	(40)
Number	r of day	s in mor	nth (Tabl	le 1a)		ı				i		1		
Ļ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wat	er heati	ng ener	gy requi	rement:								kWh/ye	ear:	
_	_	_												
Assume				[1 ovn	(0 0003	240 v (TE	FA -13.9	\2\1 + O (1012 v (TEA 12		34		(42)
	۱۵.9 کی ا کی 13.9		+ 1.70 X	[ı - exb	(-0.0003	949 X (11	-A -13.9)Z)] + 0.() X C10X	IFA - 13.	.9)			
		•	iter usag	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
		_				_	designed t	ò achieve	a water us	se target o				, ,
not more	that 125 l	litres per p	erson per	day (all w	ater use, l	hot and co	ld) 							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	r usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy co	ontent of I	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
L	!	!								rotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instanta	aneous wa	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)) to (61)			•		
(46)m=	21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water s	•													
•		, ,					storage		ame ves	sel		0		(47)
	•	•			•		litres in	` '						
			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water s	_		olorod k	ooo foot	or io kno	(Id\A/k	2/d0x/):					_ 1		(40)
,				oss facto	JI IS KIIO	WII (KVVI	i/uay).					0		(48)
-			m Table									0		(49)
• • • • • • • • • • • • • • • • • • • •			•	, kWh/ye		ar ia nat		(48) x (49)) =			0		(50)
				cylinder l om Tabl								0		(51)
		_	ee section		J _ (1.VV)	, 0/ 00	~ <i>J </i>					0		(31)
Volume	-	_										0		(52)
			m Table	2b							—	0		(53)
•				, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
•	50) or (_	,, y c				() (• 1)	(/ ^ (/				
	00,011	7 4 / 111 (3	(U									0		(55)

Water storag	e loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary circu	,	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat re	quired for	water he	eating ca	alculated	l for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW inpu	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)		_			
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	vater hea	iter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	-		-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	00.7	1		ĺ		i		()
	1	00.02	49.17	47.52	41.09	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include (57)m in cal		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		l eating	(65)
include (57	•	culation (of (65)m	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		neating	(65)
,	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal of Metabolic ga	ns (Table	culation of Table 5	of (65)m and 5a	only if c	ı :ylinder i:	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. Internal of Metabolic ga	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
5. Internal of Metabolic ga Jan (66)m= 140.43	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	neating	
5. Internal of Metabolic ga Metabolic ga Jan (66)m= 140.43	ns (Table Feb 140.43 s (calcula 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec 140.43	neating	(66)
5. Internal of Metabolic gardinal Jan (66)m= 140.43 Lighting gain (67)m= 46.04	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec 140.43	eating	(66)
5. Internal of Metabolic games Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
5. Internal of Metabolic game Metabolic game Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances game (68)m= 308.33	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	neating	(66) (67)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38 ans gains 3	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if constructions only if constructions	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if constructions only if constructions	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio 93.62 g gains (T. 79.68	culation of the Coulati	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)
5. Internal (Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin (72)m= 82.37	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62 g gains (Table 79.68 all gains =	culation of the Coulati	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southwes	st _{0.9x}	0.77	X	0.6	S5	X	10	04.39			0.24	x	0.7	=	7.9	(79)
Southwes	st _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	x	0.7	=	59.56	(79)
Southwes	st _{0.9x}	0.77	X	0.6	35	X	9	2.85			0.24	x [0.7	=	7.03	(79)
Southwes	st _{0.9x}	0.77	X	5.5	51	X	6	9.27]		0.24	x	0.7		44.43	(79)
Southwes	st _{0.9x}	0.77	X	0.6	S5	x	6	9.27]		0.24	x [0.7	=	5.24	(79)
Southwes	st _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	x [0.7		28.27	(79)
Southwes	st _{0.9x}	0.77	X	0.6	35	x	4	4.07			0.24	x	0.7		3.34	(79)
Southwes	st _{0.9x}	0.77	X	5.5	51	x	3	1.49			0.24	×	0.7		20.2	(79)
Southwes	st _{0.9x}	0.77	x	0.6	35	x	3	31.49	j		0.24	_ x [0.7		2.38	(79)
																<u> </u>
Solar ga	ains in wa	atts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gai	ins – inte	ernal a	nd sola	r (84)m =	= (73)m	+ (8	33)m	, watts								
(84)m=	583.27	616.8	643.65	671.25	687.23	66	67.49	637.02	607	.57	580.4	557.88	552.01	561.6		(84)
7. Meai	n interna	al temp	erature	(heating	season)										
	rature di	•		`			area f	from Tab	ole 9.	, Th	1 (°C)				21	(85)
•	ion facto	•	٠.			•			•	,	()					``
Γ	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	;	
(86)m=	0.99	0.99	0.98	0.94	0.85	\vdash	0.67	0.5	0.5	Ť	0.79	0.95	0.99	0.99		(86)
Moon is	nternal te	ompor	atura in	livina or	oo T1 /f/	مالد	w cto	nc 2 to 7	I 7 in T	I	. 00)		1	1		
		20.22	20.4	20.66	20.86	_	0.97	21	20.		20.94	20.69	20.36	20.09		(87)
` /				<u> </u>					l	I		20.00	1 20.00			(- /
· · ·	rature du				·			1		$\overline{}$	<u> </u>	00.00	1 00 00	00.00		(00)
(88)m=	20.07	20.07	20.07	20.08	20.08		20.1	20.1	20.	. 1	20.09	20.08	20.08	20.08		(88)
Utilisati	ion facto	r for g	ains for	rest of d	welling,	h2,	m (se	e Table	9a)					,	_	
(89)m=	0.99	0.98	0.97	0.92	0.8	C	0.59	0.4	0.4	14	0.71	0.93	0.98	0.99		(89)
Mean ir	nternal te	emper	ature in	the rest	of dwelli	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m=	18.9	19.05	19.32	19.68	19.95	2	0.08	20.09	20.	.1	20.04	19.73	19.27	18.88		(90)
<u> </u>											f	LA = Liv	ng area ÷ (4) =	0.26	(91)
Mean ir	nternal te	emper	ature (fo	r the wh	ole dwe	llind	a) = fl	LA x T1	+ (1	– fL	A) x T2					
		19.36	19.6	19.94	20.19		0.31	20.33	20.		20.28	19.98	19.56	19.2		(92)
Apply a	adjustme	nt to th	he mear	interna	l temper	<u> </u>	re fro	m Table	4e,	whe	re appro	priate	ļ			
(93)m=	19.07	19.21	19.45	19.79	20.04	2	0.16	20.18	20.	18	20.13	19.83	19.41	19.05		(93)
8. Spac	ce heatir	ng requ	uirement						<u> </u>							
Set Ti t	to the me	ean int	ernal te	mperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the utili	isation fa	actor fo	or gains	using Ta	ble 9a	_		i	ı						_	
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec	;	
	ion facto					_							1		\neg	(0.4)
` '	0.99	0.98	0.96	0.92	0.8).59	0.41	0.4	15	0.72	0.92	0.98	0.99		(94)
_	gains, hi		`	- ` `		1 00	25.00	000.40	070	00 1	445.05	540.0	T 500.00	T 555 0	□	(OF)
` '		604.58	620.24	614.42	549.65	<u> </u>	95.98	260.12	273	.28	415.05	513.6	538.69	555.35	2	(95)
	y averag	e exte	i	ri e	11.7	_		16.6	10	₁ 1	1/1	10.6	7 1	42		(96)
(96)m=			6.5	8.9			14.6	16.6	16.		14.1	10.6	7.1	4.2		(30)
_	ss rate f	or mea	an interr 973.13	806.99	616.67	_	, VV =	=[(39)m : 261.07	X [(9)	_ _	- (96)M 441.77] 682.57	914.78	1109.3	1	(97)
(07)			070.10	000.99	010.07		JU.U I	201.07	L - ' -		771.11	002.07	1 317.70	L 109.5	<u>. </u>	(3.)

Space heating requ	irement fo	or each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 401.77 317.93	1	138.65	49.87	0	0	0	0	125.71	270.79	412.14		
		•	•		•	Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	1979.42	(98)
Space heating requ	irement in	kWh/m²	²/year								26.73	(99)
8c. Space cooling re	equiremer	nt										_
Calculated for June		August.	See Tal	ole 10b					1		1	
Jan Feb		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
Heat loss rate Lm (c	calculated	using 2	o°C inter	nal tem 685.27	perature 539.47	552.51	ernal ten	nperatur 0	e from 1	able 10)		(100)
Utilisation factor for				000.27	559.47	332.31	U			0		(100)
(101)m= 0 0	0	0	0	0.86	0.93	0.9	0	0	0	0		(101)
Useful loss, hmLm (<u> </u>	0.00	1 0.0						,
(102)m = 0 0	0	0	0	591.68	500.37	499.94	0	0	0	0		(102)
Gains (solar gains o	alculated	for appli	cable w	eather re	egion, se	ee Table	10)	ļ		<u>[</u>		
(103)m= 0 0	0	0	0	706.39	673.64	637.8	0	0	0	0		(103)
Space cooling requiset (104)m to zero it				lwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (102)m] x	κ (41)m	
(104)m = 0 0	0	0	0	82.6	128.91	102.56	0	0	0	0		_
								l = Sum(,	= [314.07	(104)
Cooled fraction	Tabla 10b	.\					f C =	cooled	area ÷ (4	4) =	0.6	(105)
Intermittency factor ((106)m= 0 0	0	0	0	0.25	0.25	0.25	0	0	0	0		
(100)				0.20	0.20	0.20	l	l = Sum(=	0	(106)
Space cooling require	ement for	month =	: (104)m	× (105)	× (106)ı	m	7 0 0	· · · · · · · · · · · · · · · · · · ·	1000	l		(```
(107)m= 0 0	0	0	0	12.41	19.36	15.41	0	0	0	0		
							Total	l = Sum((107)	=	47.18	(107)
Space cooling require	ement in I	kWh/m²/	year				(107)) ÷ (4) =			0.64	(108)
9a. Energy requireme	ents – Ind	ividual h	eating sy	ystems i	ncluding	g micro-C	CHP)					
Space heating:												_
Fraction of space he	eat from s	econdar	y/supple	mentary	system					ļ	0	(201)
Fraction of space he	eat from n	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of total hea	ting from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of main s	pace heat	ting syste	em 1								89.5	(206)
Efficiency of second	lary/suppl	ementar	y heating	g systen	ո, %						0	(208)
Cooling System End	ergy Effici	ency Ra	tio								4.73	(209)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	 ar
Space heating requ	irement (d	calculate	d above))								
401.77 317.93	3 262.55	138.65	49.87	0	0	0	0	125.71	270.79	412.14		
(211) m = {[(98)m x (2	204)] } x 1	100 ÷ (20	06)									(211)
448.91 355.23	3 293.35	154.92	55.72	0	0	0	0	140.46	302.56	460.5		
						Tota	l (kWh/yea	ar) =Sum(2	211),15,1012	=	2211.65	(211)
Space heating fuel	•	• , .	month							•		_
= {[(98)m x (201)] } x	100 ÷ (20	i e									1	
(215)m = 0 0	0	0	0	0	0	0	0	0	0	0		_
						Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u>_</u>	0	(215)

Output from wa	ater hea	ter (calc 178.86	ulated al		135.27	129.6	144.48	146.07	166.33	177.56	192.18	1	
Efficiency of w			156.64	153.59	133.21	129.6	144.40	146.07	100.33	177.50	192.10	89.5	(216
(217)m= 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	00.0	(217
Fuel for water	heating,	kWh/mo	onth			<u> </u>						l	
(219)m = (64)				474.04	454.44	14404	104.40	400.04	405.05	100.00	044.70	1	
(219)m= 219.89	192.08	199.84	177.25	171.61	151.14	144.81	161.43 Tota	163.21 I = Sum(2	185.85	198.39	214.72	2180.21	(219
Space cooling	a fuel. k	Wh/mor	nth.					•	/112			2100.21	(213
(221)m = (107)						,	,	,		1	,	1	
(221)m= 0	0	0	0	0	2.63	4.1	3.26	0	0	0	0		٦,,,,,
							TOla	II = Sum(2)				9.98	(221
Annual totals Space heating		ed. main	svstem	1					K	Wh/year		2211.65	r T
Water heating			,									2180.21	\exists
Space cooling												9.98	\exists
Electricity for p			electric	kaan-ho								9.90	
	·			·		onut from	m outoid	2			450.57	1	(220
mechanical v			iceu, ext	ract or p	osilive ii	nput iroi	ii outside	3			158.57] 1	(230
central heatin	•										30		(230
								-4 (000-)	(000-)				1,004
Total electricity		above, k	kWh/yea	r			sum	of (230a).	(230g) =			188.57	╡
Electricity for li	ghting		·				sum	of (230a).	(230g) =	:		188.57 325.25	(231
•	ghting		·				sum	of (230a).	(230g) =				╡
Electricity for li	ghting		·		Fu kW	el /h/year	sum	of (230a).	Fuel P	rice			╡`
Electricity for li	ghting ets - indiv	vidual he	eating sy		kW		sum	of (230a).	Fuel P	Price 12)	x 0.01 =	325.25	╡`
Electricity for li 10a. Fuel cos Space heating	ghting sts - indiv	vidual he	eating sy		kW (211	/h/year	sum	of (230a).	Fuel P (Table	Price 12)	x 0.01 = x 0.01 =	325.25 Fuel Cost £/year	(232
Electricity for li 10a. Fuel cos Space heating Space heating	ghting ets - indiv - main s - main s	vidual he system 1 system 2	eating sy		kW (211 (213	/h/year	sum	of (230a).	Fuel P (Table	Price 12)		325.25 Fuel Cost £/year 76.97	(232
Electricity for li	ghting ts - indiv main s main s	vidual he system 1 system 2 dary	eating sy		kW (211 (213	/h/year 1) x 3) x 5) x	sum	of (230a).	Fuel P (Table	Price 12)	x 0.01 =	325.25 Fuel Cost £/year 76.97	(240)
Electricity for li 10a. Fuel cos Space heating Space heating Space heating Water heating	ghting ts - indiv main s main s	vidual he system 1 system 2 dary	eating sy		kW (211 (213 (218	/h/year 1) x 3) x 5) x	sum	of (230a).	Fuel P (Table 3.4	Price 12)	x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 76.97 0	(242 (242 (247 (247
Electricity for li 10a. Fuel cos Space heating Space heating Space heating	ghting ts - indiv main s main s secon cost (oth	vidual he system 1 system 2 dary ner fuel)	eating sy		(213 (214 (215	/h/year 1) x 3) x 5) x 9)	sum	of (230a).	Fuel P (Table 3.4 0 13. 3.4	Price 12) 18 19 19	x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 76.97 0 0 75.87	(242 (242 (242
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Water heating Space cooling Pumps, fans a	ghting ts - indiv main s main s secon cost (oth	vidual he system 1 system 2 dary ner fuel) ric keep-	eating sy	stems:	(21s) (21s) (21s) (21s) (22s) (23s)	/h/year 1) x 3) x 5) x 9) 1)			Fuel P (Table 3.4 0 13. 13. 13.	Price 12) 18 19 19 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 76.97 0 0 75.87 1.32 24.87	(240 (241 (242 (247 (248
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Space cooling Pumps, fans a	ghting ts - indiv main s main s secon cost (oth	vidual he system 1 system 2 dary ner fuel) ric keep-	eating sy	stems:	(21s) (21s) (21s) (21s) (22s) (23s)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 0 13. 13. 13.	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 76.97 0 0 75.87 1.32 24.87	(240 (241 (242 (247 (248
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Water heating Space cooling Pumps, fans a (if off-peak tari Energy for ligh	ghting ts - indiv main s main s secon cost (oth nd electi ff, list eating	vidual he system 1 system 2 dary ner fuel) ric keep- ich of (23	eating sy ehot 30a) to (stems: 230g) se	kW (211 (213 (215 (219 (227 (237	/h/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 76.97 0 0 75.87 1.32 24.87 Table 12a	(242) (241) (242) (243) (248)
Electricity for li 10a. Fuel cos Space heating Space heating Space heating Water heating Space cooling	ghting - main s - main s - secondost (other and electronic diff, list eatting anding characters	vidual her system 2 dary ner fuel) ric keep- ich of (23	eating sy chot 30a) to (able 12)	stems: 230g) se	kW (211 (213 (215 (224 (234 eparately (232	/h/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 76.97 0 0 75.87 1.32 24.87 Table 12a 42.9	(242 (242 (242 (243 (243 (243 (250
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Water heating Pumps, fans a (if off-peak tari Energy for ligh Additional star	ghting - main s - main s - secon cost (oth nd electi ff, list eating nding cha	system 1 system 2 dary ner fuel) ric keep- och of (23 arges (Ta	eating sy chot 30a) to (able 12)	stems: 230g) se	kW (211 (213 (215 (224 (234 eparately (232	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 76.97 0 0 75.87 1.32 24.87 Table 12a 42.9	(24) (24) (24) (24) (24) (25)
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Water heating Pumps, fans a (if off-peak tari Energy for ligh Additional star	ghting - main s - main s - secondost (other rd electron ff, list eating ading char ems: repo	ridual her system 1 system 2 dary ner fuel) ric keep- ich of (23 arges (Ta	eating sy -hot 30a) to (able 12)	stems: 230g) se nd (254) (245)(kW (211 (213 (215 (215 (222 (232 eparately (232	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 76.97 0 75.87 1.32 24.87 Table 12a 42.9 120	(242 (242 (242 (243 (243 (243 (250
Electricity for li 10a. Fuel cos Space heating Space heating Water heating Water heating Pumps, fans a (if off-peak tari Energy for ligh Additional star Appendix Q ite	ghting - main s - main s - secondost (other modelection ff, list eating moding char ems: report y cost ng - indirect graph of the cost	vidual here system 1 system 2 dary her fuel) ric keep- uch of (23 arges (Taleat lines	eating sy ehot 30a) to (able 12) (253) an eating sy	stems: 230g) se nd (254) (245)(kW (211 (213 (215 (215 (222 (232 eparately (232	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 76.97 0 75.87 1.32 24.87 Table 12a 42.9 120	(24) (24) (24) (24) (24) (25)

12a. CO2 emissions – Individual heating systems including micro-CHP **Energy Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year (211) x Space heating (main system 1) (261)0.216 477.72 Space heating (secondary) (215) x (263)0.519 0 Water heating (219) x 470.92 (264)0.216 (261) + (262) + (263) + (264) =Space and water heating (265)948.64 (221) x Space cooling 0.519 (266)5.18 Electricity for pumps, fans and electric keep-hot (231) x (267)0.519 97.87 (232) x Electricity for lighting (268)0.519 168.8 sum of (265)...(271) = Total CO2, kg/year 1220.49 (272)CO2 emissions per m² $(272) \div (4) =$ (273)16.48 El rating (section 14) (274)86 13a. Primary Energy **Energy Primary** P. Energy kWh/year factor kWh/year (211) x Space heating (main system 1) (261)1.22 2698.21 (215) x Space heating (secondary) (263)3.07 0 Energy for water heating (219) x2659.85 (264)1.22 (261) + (262) + (263) + (264) =Space and water heating (265)5358.06

(221) x

(231) x

(232) x

3.07

3.07

0

sum of (265)...(271) =

 $(272) \div (4) =$

SAP rating (Section 12)

Space cooling

Electricity for lighting

'Total Primary Energy

Primary energy kWh/m²/year

Electricity for pumps, fans and electric keep-hot

(258)

(266)

(267)

(268)

(272)

(273)

30.65

578.91

998.51

6966.13

94.06

83.17

		User D	Notaile:						
		USELL					OTDO	04000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom: Softwa					016363 on: 1.0.4.10	
Software Name.		Property	Address				VEISIO	лт. т. 0.4 .то	
Address :		торопту	/ (dd1000.	1 100 1 2	Loan				
1. Overall dwelling dime	ensions:								
		Are	a(m²)		Av. He	ight(m)	_	Volume(m³))_
Basement		7	76.06	(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1e)	n) 7	76.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:			_		_				
	main seconda heating heating	ry	other		total			m³ per hou	r
Number of chimneys	0 + 0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ans				0	x -	10 =	0	(7a)
Number of passive vents	3			Ē	0	x ·	10 =	0	(7b)
Number of flueless gas f	ires			F	0	x	40 =	0	(7c)
							Air ch	anges per ho	ur
	eys, flues and fans = $(6a)+(6b)+(6b)$				0		÷ (5) =	0	(8)
	been carried out or is intended, proceed be dwelling (pp)	ed to (17),	otherwise o	ontinue fr	om (9) to	(16)	ı		7.00
Number of storeys in t Additional infiltration	rie dweiling (ris)					[(9)	-1]x0.1 =	0	(9) (10)
	0.25 for steel or timber frame of	r 0.35 fo	r masonr	y constr	uction	1(0)	.,,	0	(11)
	resent, use the value corresponding to	o the great	ter wall are	a (after					」 ` ′
deducting areas of openi	ings); if equal user 0.35 floor, enter 0.2 (unsealed) or 0	1 (cool	ad) also	ontor O			ı		7(40)
If no draught lobby, en	,	. i (Seale	eu), eise	enter 0				0	(12)
•	s and doors draught stripped							0	(14)
Window infiltration	o ama accio anaagim ciiippoa		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metre	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20] + ($	8), otherw	ise (18) = (16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	meability	is being u	sed	Ī		_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	n 075 x (1	19)1 –			3	(19)
Infiltration rate incorpora	ting shelter factor		(20) = 1 $(21) = (18)$					0.78	(20)
Infiltration rate modified			(21) - (10)	X (20) =				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7					· ·		ı	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) == (2	(2)m : 4	•	•			•		•	
Wind Factor (22a)m = (2 $(22a)m = 1.27$ 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
,,,,		1 5.00		•				I	

Adjusted infiltra	alion rate (allow	ving for sl	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
	ctive air change	rate for t	he appli	cable ca	se	•	•	•	•			— ,
	al ventilation: eat pump using App	nondiy N (C	93h) — (93a	a) Em. /c	auation (VEVV otho	nuico (22h) - (220)			0.5	(23a)
	n heat recovery: effi) = (23a)			0.5	(23b)
	-	-	_					2h\ (00h) [(22°)	76.5	(23c)
a) if balance (24a)m= 0.27	ed mechanical v	0.25	0.24	at recove	0.23	0.23	0.23	2b)m + (. 0.24	23D) x [¹ 0.25	0.25	÷ 100]	(24a)
` ′	ļļ_		<u> </u>				<u> </u>	<u> </u>	<u> </u>	0.23		(244)
	ed mechanical v				overy (r		$\int_{0}^{\infty} \int_{0}^{\infty} dx = (22)$	 				(24b)
` ′	0 0	0	0	0		0		0	0	0		(240)
,	ouse extract vent $< 0.5 \times (23b)$,		•	•				.5 × (23b))			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
,	ventilation or w			•				0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a) or (24b	o) or (240	c) or (24	d) in box	· (25)				l	
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
2 Hastlesse	s and heat loss	10 0 40 100 0 th										
ELEMENT	Gross area (m²)	Openin m	ıgs	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-ł		X k J/K
Doors				2.6	х	1.2	_ = [3.12				(26)
Windows Type) 1			3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	2			3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	3											
Windows Type				5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(27)
Floor	: 4			5.51 0.65	=	/[1/(1.2)+ /[1/(1.2)+	l.	6.31				(27) (27)
LIOOI	4			0.65	x1	/[1/(1.2)+	l.	0.74			-	(27)
		20.5	8	0.65	x1	/[1/(1.2)+ 0.11	0.04] =	0.74				(27)
Walls Type1	38.14	20.5		0.65 14.36 17.56	x1 x	/[1/(1.2)+ 0.11 0.15	0.04] = [0.74 1.5796 2.63				(27) (28) (29)
Walls Type1 Walls Type2	38.14	2.6		0.65 14.36 17.56 21.32	x1 x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29)
Walls Type1 Walls Type2 Walls Type3	38.14 23.92 5.95	2.6		0.65 14.36 17.56 21.32 5.95	x1 x2 x2 x4 x4 x4 x4 x4 x4 x4	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (29) (31)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area	38.14 23.92 5.95 29.51 elements, m²	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (31) (32) (32a (32b)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0	as given in		39.42	(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A x k)	2.6 0 0 effective wiinternal wall	indow U-ve	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx xx xx xx x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	effective with internal wall x U)	indow U-va lls and par	0.65 14.36 17.56 21.32 5.95 29.51 111.8i 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx ated using	0.11 0.15 0.15 0.15 0.15 0.15 0.16 0.17 0.17	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0 (a) (a) (b) (a) (a) (b) (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c		(32e) =	39.42	(27) (28) (29) (29) (29) (31) (32) (32a)

n be u														(36
	Ū	,	,		using Ap	•	^						18.24	(0,
	or tnerma abric hea		are not kn	own (36) =	= 0.15 x (3	11)			(33) +	(36) =			57.66	(3
			alculated	l monthly	V					, ,	25)m x (5)		07.00	(•
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat tr	ansfer c	oefficier	nt. W/K			I			(39)m	= (37) + (37)	38)m	ı	I	
9)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24		
eat lo	ss para	meter (F	HLP), W/	m²K			!	!		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	73.62	(3
0)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		
′	ļ					ļ	<u> </u>	<u> </u>	,	Average =	Sum(40) ₁ .	12 /12=	0.97	(4
umbe	er of day	s in mor	nth (Tab	le 1a)							•	•		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
I. Wa	iter heat	ing ener	gy requi	rement:								kWh/y	ear:	
eeum	ed occu	nancy I	NI.								2.	20		(-
if TF		9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		30	I	·
if TF. if TF. nnual educe	A > 13.9 A £ 13.9 I averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		9)	.82		(
if TF. if TF. nnual educe	A > 13.9 A £ 13.9 I averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by a day (all w	es per da 5% if the d vater use, I	ay Vd,av Iwelling is thot and co	erage = designed	(25 x N) to achieve	+ 36 a water us		9)	.82		(
if TF if TF nnual educe t more	A > 13.9 A £ 13.9 I averag the annua e that 125 Jan	P, N = 1 P, N = 1 P hot was Al average Stress per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the a	ay Vd,av dwelling is hot and co	erage = designed (bld) Jul	(25 x N) to achieve	+ 36	se target o	9) 90			(
if TF. if TF. innual iduce it more	A > 13.9 A £ 13.9 I averag the annua e that 125 Jan	P, N = 1 P, N = 1 P hot was Al average Stress per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av dwelling is hot and co	erage = designed (bld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 90	.82		(
if TF. if TF. innual educe t more t wate	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan er usage in 99.9	P, N = 1 P, N = 1 Po hot was all average litres per p Peb n litres per 96.27	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the a vater use, I May Vd,m = fa 85.37	ay Vd,av Iwelling is hot and co Jun ctor from 1	rerage = designed (d) Jul Table 1c x 81.73	(25 x N) to achieve Aug (43) 85.37	+ 36 a water us Sep	Oct 92.63 Fotal = Su	9) 90 Nov 96.27 m(44) ₁₁₂ =	Dec 99.9	1089.8	
if TF. if TF. innual educe t more ot wate 1)m=	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan er usage in 99.9	P, N = 1 P, N = 1 Po hot was all average litres per p Peb n litres per 96.27	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the a vater use, I May Vd,m = fa 85.37	ay Vd,av Iwelling is hot and co Jun ctor from 1	rerage = designed (d) Jul Table 1c x 81.73	(25 x N) to achieve Aug (43)	+ 36 a water us Sep	Oct 92.63 Fotal = Su	9) 90 Nov 96.27 m(44) ₁₁₂ =	Dec 99.9	1089.8	
if TF. if TF. innual educe t more t wate	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan er usage in 99.9	P, N = 1 P, N = 1 Po hot was all average litres per p Peb n litres per 96.27	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the a vater use, I May Vd,m = fa 85.37	ay Vd,av Iwelling is hot and co Jun ctor from 1	rerage = designed (d) Jul Table 1c x 81.73	(25 x N) to achieve Aug (43) 85.37	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su 121.03	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	.82 Dec 99.9		
if TF. if TF. innual educe t more t wate innual of wate innual of wate innual	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 99.9 content of 148.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - calc 133.7	ge in litre usage by day (all w Apr ach month 89 culated me 116.57	es per da 5% if the orater use, I May $Vd,m = fa$ 85.37 $enthly = 4$.	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44	(25 x N) to achieve Aug (43) 85.37 27m / 3600 102.63	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su 121.03	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1	.82 Dec 99.9	1089.8	
if TF. if TF. nnual duce t more t water ergy c ergy c enstant	A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in 99.9 content of 148.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - call 133.7	Apr Apr ach month 89 culated mo 116.57	es per da 5% if the of rater use, I May Vd,m = far 85.37 onthly = 4.	ay Vd,av liwelling is that and co Jun ctor from 7 81.73 190 x Vd,r 96.52	erage = designed and designed a	(25 x N) to achieve Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su 121.03 Fotal = Su	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	.82 Dec 99.9		
if TF. if TF. innual duce t more t wate ergy c instant	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 99.9 content of 148.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - calc 133.7	ge in litre usage by day (all w Apr ach month 89 culated me 116.57	es per da 5% if the orater use, I May $Vd,m = fa$ 85.37 $enthly = 4$.	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44	(25 x N) to achieve Aug (43) 85.37 27m / 3600 102.63	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su 121.03	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	.82 Dec 99.9		
if TF. if	A > 13.9 A £ 13.9 A £ 13.9 A verage the annual enthat 125 Jan Per usage in 99.9 Content of 148.15 Taneous w 22.22 Storage	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - calc 133.7 ng at point 20.06	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no	es per da 5% if the da 5% if th	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52 r storage),	erage = designed in designed i	(25 x N) to achieve Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	+ 36 a water us Sep 89 103.86 105.58	Oct 92.63 Fotal = Su 121.03 Fotal = Su 18.16	9) Nov 96.27 m(44) 112 = ables 1b, 1 132.12 m(45) 112 =	.82 Dec 99.9		
if TF. if TF. innual duce t more t water ergy c ergy c innual inn	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 99.9 content of 148.15 raneous w 22.22 storage e volum	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - calc 133.7 ag at point 20.06	ge in litre usage by day (all w Apr ach month 89 culated me 116.57 of use (no	es per da 5% if the da 5% if th	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa	+ 36 a water us Sep 89 103.86 105.58	Oct 92.63 Fotal = Su 121.03 Fotal = Su 18.16	9) Nov 96.27 m(44) 112 = ables 1b, 1 132.12 m(45) 112 =	.82		
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if TF, if TF, in	A > 13.9 A £ 13.9 A £ 13.9 A æ that 125 Jan er usage ir 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufact	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 133.7 against 20.06 including the model of the water declared learly 1.76 x ater usage hot water person per day for early 1.76 x 20.06	Apr Apr Ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fat 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS .nter 110 nstantar	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	.82 Dec 99.9 c, 1d) 143.47 21.52 0		
if TF. in TF. in TF. in Inual educe it more of water instant fater: coragic committees ater: interval	A > 13.9 A £ 13.9 A £ 13.9 A £ 13.9 A æ that 125 Jan Per usage ir 99.9 Content of 148.15 Faneous w 22.22 Storage e volum munity h vise if no storage e anufaction	Poly N = 1 Poly N = 1	+ 1.76 x ater usag hot water person per Mar day for ea 92.63 used - call 133.7 ag at point 20.06 includin nd no ta hot water eclared le m Table	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b	es per da 5% if the of water use, I May Vd,m = fat 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ocludes i	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS .nter 110 nstantar	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	9) Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	.82 Dec 99.9		
if TF. if TF. innual educe of more of water 4)m= mergy of instant committee torage committee ater: itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage committee itorage itorage committee itorage i	A > 13.9 A £ 13.9 A £ 13.9 A £ 13.9 A æ that 125 Jan Per usage ir 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage e anufaction erature far	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for ear 92.63 used - call 133.7 ag at point 20.06 includin nd no tall hot water eclared less torage	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = far 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ocludes i or is knowear	ay Vd,av liwelling is hot and co Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	9) Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	.82 Dec 99.9 c, 1d) 143.47 21.52 0		
if TF. if TF. innual educe of more to wate 4)m= instant comment torage comment therw dater: in gempe nergy) If m of wate	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 199.9 content of 148.15 raneous w 22.22 storage e volum munity he vise if no storage in anufaction anufacti	P, N = 1 P,	ter usage hot water overson per Mar day for ear 92.63 used - calcal 133.7 ag at point 20.06 including and no talcal to the water storage eclared of factor fr	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fat 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ocludes i	ay Vd,av liwelling is that and color from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS Inter 110 Instantar wn (kWh	rerage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	.82 Dec 99.9		
if TF. if TF. innual educe of more of wate 4)m= mergy of finstant forage committees torage committees finery finery forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage committees forage forage forage committees forage fo	A > 13.9 A £ 13.9 A £ 13.9 A £ 13.9 A æ that 125 Jan Per usage ir 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage e anufaction erature far a lost fro anufaction erature far a lost fro anufaction erature far a lost fro anufaction erature far a lost fro anufaction erature far anufaction erature far a lost fro a lost fro	P, N = 1 P,	ter usage hot water person per day for ear 92.63 used - call 133.7 ag at point 20.06 including a hot water eclared lessonage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i or is kno	ay Vd,av liwelling is that and color from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS Inter 110 Instantar wn (kWh	rerage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	9) 90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	.82 Dec 99.9 c, 1d) 143.47 21.52 0 0 0		(.) (.) (.) (.)

Energy lost from v	ater storan	≥ k\/\h/v	ear			(47) x (51)) x (52) x (53) -		0	1	(54)
Enter (50) or (54)	_	e, Kvvii/y	cai			(1 1) X (01)) X (32) X (55) =		0		(55)
Water storage loss	` ,	for each	month			((56)m = ((55) × (41)ı	m		0		(00)
	0 0	Ι ο	0	0	0	0	0	0	0	0		(56)
If cylinder contains dec											l ix H	,
(57)m= 0	0 0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit los	s (annual) fr	om Table		•	•	•	•			0		(58)
Primary circuit los				59)m = ((58) ÷ 36	65 × (41)	m					
(modified by fac	tor from Tab	ole H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcula	ated for eacl	h month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.91 44	.31 47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat require	for water h	neating ca	alculated	for eac	h month	(62)m =	: 0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05 17	3.88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input calcu	ated using App	pendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additional line	es if FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	heater											
(64)m= 199.05 17	3.88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		_
						Outp	out from wa	ater heate	r (annual)₁	12	1973.65	(64)
Heat gains from w	ater heating	j, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1 + 0.8 x	(46)m	+ (57)m	+ (59)m	1	
					` '	. (0.)	.,	. [(. •)	() . ,	(/		
(65)m= 61.99 54	.16 56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43	,	(65)
(65)m= 61.99 54 include (57)m in				<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
	calculation	of (65)m	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m ir	calculation (see Table	of (65)m 5 and 5a	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (7)	calculation (see Table	of (65)m 5 and 5a	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (1 Jan F	calculation (see Table able 5), Wa	of (65)m 5 and 5a tts	only if o	ylinder i	40.15 s in the o	45 dwelling	45.5 or hot w	52.04 ater is fr	55.8	60.43 munity h		(65)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F	calculation (see Table able 5), Wareb Mar 3.03 143.03	of (65)m 5 and 5a tts Apr 143.03	only if c): May 143.03	Jun 143.03	40.15 s in the 0	45 dwelling Aug 143.03	45.5 or hot w Sep 143.03	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal	calculation (see Table able 5), Wareb Mar 3.03 143.03	of (65)m 5 and 5a tts Apr 143.03	only if c): May 143.03	Jun 143.03	40.15 s in the 0	45 dwelling Aug 143.03	45.5 or hot w Sep 143.03	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A 77 33.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72	only if co.): May 143.03 L, equat 19.22	Jun 143.03 ion L9 o	40.15 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 Iso see	45.5 or hot w Sep 143.03 Table 5	52.04 ater is fr Oct 143.03 38.85	55.8 com com Nov 143.03	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A 77 33.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72	only if co.): May 143.03 L, equat 19.22	Jun 143.03 ion L9 o	40.15 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 Iso see	45.5 or hot w Sep 143.03 Table 5	52.04 ater is fr Oct 143.03 38.85	55.8 com com Nov 143.03	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Append 292.44	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11	55.8 rom com Nov 143.03	60.43 munity h Dec 143.03		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Append 292.44	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11	55.8 rom com Nov 143.03	60.43 munity h Dec 143.03		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal	calculation (see Table stable 5), Wareb Mar 3.03 143.03 culated in A 33.97 calculated i 3.21 309.97 culated in A 69 51.69	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69	only if construction only in construction only in construction only in c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table	52.04 ater is fr Oct 143.03 38.85 ole 5 258.11 5	55.8 rom com Nov 143.03 45.34	Dec 143.03 48.34 301.04		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g	calculation (see Table stable 5), Wareb Mar 3.03 143.03 culated in A 33.97 calculated i 3.21 309.97 culated in A 69 51.69	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69	only if construction only in construction only in construction only in c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table	52.04 ater is fr Oct 143.03 38.85 ole 5 258.11 5	55.8 rom com Nov 143.03 45.34	Dec 143.03 48.34 301.04		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g	calculation (see Table able 5), Wareb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 culated in A .69 51.69 ains (Table 3 3	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor	calculation (see Table able 5), Wareb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 culated in A .69 51.69 ains (Table 3 3	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor	calculation (see Table able 5), Wa eb Mar 3.03 143.03 culated in A 77 33.97 calculated i 3.21 309.97 culated in A 69 51.69 ains (Table 3 3 ration (nega	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69 5a) 3 ative value	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor (71)m= -95.35 -99 Water heating gain	calculation (see Table able 5), Wa eb Mar 3.03 143.03 culated in A 77 33.97 calculated i 3.21 309.97 culated in A 69 51.69 ains (Table 3 3 ration (nega	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69 5a) 3 ative value	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor (71)m= -95.35 -99 Water heating gain	calculation (see Table sable 5), Wareb Mar 3.03 143.03 culated in Ar 77 33.97 calculated in Ar 69 51.69 ains (Table 3 3 ration (negations) 63.25 -95.35 65 75.62	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ble 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 3 -95.35	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35	55.8 om com Nov 143.03 45.34 280.24 51.69 3 -95.35	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapol (71)m= -95.35 -99 Water heating gain (72)m= 83.31 80 Total internal gains	calculation (see Table sable 5), Wareb Mar 3.03 143.03 culated in Ar 77 33.97 calculated in Ar 69 51.69 ains (Table 3 3 ration (negations) 63.25 -95.35 65 75.62	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ble 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69 3 -95.35	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35	55.8 om com Nov 143.03 45.34 280.24 51.69 3 -95.35	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapol (71)m= -95.35 -99 Water heating gain (72)m= 83.31 80 Total internal gains	calculation (see Table able 5), Wa eb Mar 3.03	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 51.69 5a) 3 ative valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ole 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69 3 -95.35	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35 60.48 1+ (68)m -	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69 3 -95.35 63.2 + (69)m + (52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35 69.95 70)m + (7	55.8 Tom com Nov 143.03 45.34 280.24 51.69 3 -95.35 77.5 1)m + (72)	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southwe	est _{0.9x}	0.77	x	0.6	35	X	10	04.39			0.24	x	0.7	=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	9	2.85			0.24	x	0.7	=	59.56	(79)
Southwe	est _{0.9x}	0.77	X	0.6	65	X	9	2.85			0.24	x	0.7	=	7.03	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	6	9.27]		0.24	x	0.7	=	44.43	(79)
Southwe	est _{0.9x}	0.77	х	0.6	35	x	6	9.27]		0.24	x [0.7	=	5.24	(79)
Southwe	est _{0.9x}	0.77	х	5.5	51	x	4	4.07			0.24	x	0.7	=	28.27	(79)
Southwe	est _{0.9x}	0.77	X	0.6	35	x	4	4.07			0.24	x	0.7	=	3.34	(79)
Southwe	est _{0.9x}	0.77	х	5.5	51	x	3	1.49			0.24	×	0.7	_ =	20.2	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	3	31.49			0.24	x	0.7	=	2.38	(79)
	_															_
Solar g	ains in	watts, ca	alculated	I for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total g	ains – ir	nternal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts					-		_	
(84)m=	592.98	626.44	652.89	679.88	695.21	6	74.9	644.12	614	.78	587.98	566.07	560.89	571.02		(84)
7. Mea	an inter	nal temp	perature	(heating	season)										
			neating p	,		<i>'</i>	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
•		_	ains for l			-					, ,					
ſ	Jan	Feb	Mar	Apr	May	È	Jun	Jul	A	ug	Sep	Oct	Nov	Dec]	
(86)m=	0.99	0.99	0.98	0.94	0.85	(0.66	0.49	0.5	53	0.78	0.95	0.99	0.99	1	(86)
Mean	interna	l tampar	ature in	livina ar	 aa T1 (f(مالد	w eta	ne 3 to 7	7 in T	ahle	a 0c)				1	
(87)m=	20.15	20.25	20.43	20.68	20.88	_	0.98	21	20.	_	20.94	20.71	20.4	20.13	1	(87)
L			<u> </u>		<u>l</u>			<u> </u>	<u> </u>]	, ,
· r	20.09	auring r	eating p	eriods ir	20.11	_	eiiing 0.12	20.12	20.	$\overline{}$	20.12	20.11	20.11	20.1	1	(88)
(88)m=	20.09	20.1	20.1	20.11	20.11		0.12	20.12	20.	12	20.12	20.11	20.11	20.1	j	(00)
Г			ains for						r –						7	
(89)m=	0.99	0.98	0.97	0.92	0.8	().58	0.4	0.4	14	0.71	0.93	0.98	0.99]	(89)
Mean	interna	l temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_	
(90)m=	18.98	19.13	19.39	19.74	19.99	2	0.11	20.12	20.	12	20.07	19.79	19.34	18.96		(90)
											f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m=	19.28	19.42	19.65	19.98	20.22	1	0.33	20.34	20.		20.3	20.02	19.61	19.26]	(92)
Apply	adjustn	nent to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate			4	
(93)m=	19.13	19.27	19.5	19.83	20.07	2	0.18	20.19	20.	19	20.15	19.87	19.46	19.11]	(93)
8. Spa	ace hea	ting requ	uirement													
				•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-cal	culate	
the uti			or gains			_					_	_	1		1	
[Jan	Feb	Mar	Apr	May	L	Jun	Jul	A	ug	Sep	Oct	Nov	Dec]	
г	0.99	0.98	ains, hm		0.8		. 50	0.4			0.71	0.00	1 0 00	0.00	1	(94)
(94)m=			0.96	0.91			0.59	0.4	0.4	14	0.71	0.92	0.98	0.99	J	(34)
(95)m=	585.16	614.1	W = (94)	621.51	553.27	30	96.34	259.94	273	10	416.9	520.34	547.36	564.77	1	(95)
L			ernal tem			<u> </u>		200.04	273	.15	410.5	320.34	1 047.00	304.77]	(00)
(96)m=	4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	1	(96)
L			I o.o an intern					<u> </u>					1		1	(= 7)
Г		1074.65	970.4	805.04	615	_	, vv - 04.71	260.72	274	_	440.83	681.25	912.88	1106.68	1	(97)
` / "							•		<u> </u>	!			1		1	. ,

Space heatir	ng requir	ement fo	r each n	nonth, k\	/Vh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 392.2	309.49	253.94	132.14	45.93	0	0	0	0	119.72	263.18	403.19		_
							Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	1919.77	(98)
Space heatir	ng requir	ement in	kWh/m²	² /year								25.24	(99)
8c. Space co	ooling red	quiremen	nt										
Calculated for										1	1	l	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
Heat loss rat	te Lm (ca	liculated 0	using 2:		681.81	536.74	549.81	ernai ten	nperatur 0	e from 1	able 10)		(100
Utilisation fa			0	0	001.01	330.74	343.01				0		(100)
(101)m= 0	0	0	0	0	0.87	0.93	0.91	0	0	0	0		(101
Useful loss,	hmLm (V			(101)m	<u> </u>				<u> </u>				
102)m= 0	0	0	0	0	595.19	501.61	502.07	0	0	0	0		(102
Gains (solar	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m= 0	0	0	0	0	713.8	680.73	645.01	0	0	0	0		(103
Space cooling set (104)m to	•				lwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	c (41)m	
(104)m= 0	0	0	0	0	85.4	133.26	106.34	0	0	0	0		
									l = Sum(,	=	325.01	(104
Cooled fraction		oblo 10b	١					f C =	cooled	area ÷ (4	4) =	0.59	(105
ntermittency (106)m= 0	0	able Tub	0	0	0.25	0.25	0.25	0	0	0	0		
0	<u> </u>	"	0	0	0.20	0.20	0.20	l	l = Sum(=	0	(106
Space cooling	g require	ment for	month =	(104)m	× (105)	× (106)ı	m	70101	ı – Gam	16008 1/	_		
107)m= 0	0	0	0	0	12.49	19.49	15.55	0	0	0	0		
							•	Total	= Sum(107)	=	47.54	(107
Space cooling	g require	ment in k	:Wh/m²/y	/ear				(107)) ÷ (4) =			0.63	(108
9a. Energy re	quiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	g micro-C	CHP)					
Space heati	_												_
Fraction of s	pace hea	at from so	econdar	y/supple	mentary	system						0	(201
Fraction of s	pace hea	at from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202
Fraction of to	otal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204
Efficiency of	main spa	ace heat	ing syste	em 1								89.5	(206
Efficiency of	seconda	ry/suppl	ementar	y heating	g systen	า, %						0	(208
Cooling Syst	tem Ener	gy Efficie	ency Ra	tio								4.73	(209
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	 ear
Space heating			· ·			!		<u>'</u>	<u>!</u>	!	<u>!</u>	,	
392.2	309.49	253.94	132.14	45.93	0	0	0	0	119.72	263.18	403.19		
(211)m = {[(98	B)m x (20)4)] } x 1	00 ÷ (20	06)		-			-	-	-		(211
438.21	345.8	283.73	147.64	51.31	0	0	0	0	133.77	294.05	450.49		
	•	•			•	•	Tota	l (kWh/yea	ar) =Sum(2	211),15,1012	<u>-</u>	2145	(211
Space heatir	ng fuel (s	econdar	y), kWh/	month									_
= {[(98 <u>)</u> m x (2	01)] } x 1	00 ÷ (20	8)		•							•	
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	2=	0	(215)

Output from water heate	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38]	
Efficiency of water heat	er				l						89.5	(2
217)m= 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(2
uel for water heating, k												
$219)m = (64)m \times 100 = 219)m = 222.41 194.28 $	÷ (217) 202.13	m 179.28	173.58	152.88	146.47	163.28	165.08	187.98	200.66	217.18]	
					Į	Tota	ıl = Sum(2	19a) ₁₁₂ =	Į	l	2205.19	(2
Space cooling fuel, kV		nth.										
$ 221) m = (107) m \div (209) $ $ 221) m = $) 0	0	0	2.64	4.13	3.29	0	0	0	0	1	
0 0	0	U	U	2.04	4.13		l = Sum(2:				10.06	(2:
Annual totals									Wh/year		kWh/yea	
Space heating fuel used	d, main	system	1						, oa.		2145	
Vater heating fuel used	l										2205.19	1
Space cooling fuel used	i										10.06	7
Electricity for pumps, fai	ns and	electric l	keep-ho	t								_
mechanical ventilation	- balan	ced, ext	ract or p	ositive i	nput fror	n outside	е			162.85]	(2
central heating pump:			·							30]]	(2:
otal electricity for the a	above, k	«Wh/yea	r			sum	of (230a).	(230g) =			192.85	_(2
•		,										
Electricity for lighting												╡`
Electricity for lighting 10a. Fuel costs - indivi	dual he	ating sv	stems:								332.22	╡`
Electricity for lighting 10a. Fuel costs - indivi	dual he	ating sy	stems:	-	-1			515			332.22	(23
	dual he	eating sy	stems:	Fu kW	el /h/year			Fuel P (Table	rice		332.22	╡`
			stems:	kW				(Table	rice 12)	x 0.01 =	332.22 Fuel Cost £/year	╡`
10a. Fuel costs - indivi	/stem 1	<u> </u>	stems:	kW (21	/h/year				rice 12)	x 0.01 = x 0.01 =	332.22	(2:
10a. Fuel costs - indiving - main sy Space heating - main sy	/stem 1 /stem 2	<u> </u>	stems:	kW (21:	/h/year 1) x			(Table	rice 12)		332.22 Fuel Cost £/year 74.65	(23)
10a. Fuel costs - indiving - main sy Space heating - main sy Space heating - second	/stem 1 /stem 2 ary	<u> </u>	stems:	kW (21:	/h/year 1) x 3) x 5) x			(Table 3.4 0 13.	Price 12)	x 0.01 =	332.22 Fuel Cost £/year 74.65 0	(24)
10a. Fuel costs - individual forms of the second of the se	/stem 1 /stem 2 ary	<u> </u>	stems:	(21:	/h/year 1) x 3) x 5) x			(Table 3.4 0 13. 3.4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Price 12)	x 0.01 = x 0.01 =	332.22 Fuel Cost £/year 74.65 0 0 76.74	(24) (24) (24)
10a. Fuel costs - individual forms of the second of the se	/stem 1 /stem 2 ary er fuel)		stems:	(21: (21: (21: (21: (22:	/h/year 1) x 3) x 5) x 9)			(Table 3.4 0 13. 13.	Price 12) 88 19 19	x 0.01 = x 0.01 = x 0.01 =	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33	(2)
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electric	/stem 1 /stem 2 ary er fuel) c keep-	hot		(21: (21: (21: (21: (22: (23:	/h/year 1) x 3) x 5) x 9) 1)		ind apply	(Table 3.4 0 13. 13. 13.	Price 12) 18 19 19 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44	(2-) (2-) (2-) (2-) (2-)
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electrical of off-peak tariff, list each	/stem 1 /stem 2 ary er fuel) c keep-	hot		(21: (21: (21: (21: (22: (23:	/h/year 1) x 3) x 5) x 9) 1) 1) y as app		nd apply	(Table 3.4 0 13. 13. 13.	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44	(2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electrical off-peak tariff, list each energy for lighting	/stem 1 /stem 2 lary er fuel) c keep- ch of (23	hot 30a) to (kW (21) (21) (21) (22) (23) eparately	/h/year 1) x 3) x 5) x 9) 1) 1) y as app		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44 Table 12a	(2 (2 (2 (2 (2 (2 (2
10a. Fuel costs - individual forms of the second of the se	ystem 1 ystem 2 lary er fuel) c keep- ch of (23 rges (Ta	hot 30a) to (3 able 12)	230g) se	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44 Table 12a 43.82	(2 (2 (2 (2 (2 (2 (2 (2
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electric off-peak tariff, list each energy for lighting additional standing characteristics.	ystem 1 ystem 2 lary er fuel) c keep- ch of (23 rges (Ta	hot 30a) to (3 able 12)	230g) se nd (254)	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44 Table 12a 43.82	(2 (2 (2 (2 (2 (2 (2 (2
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other Space cooling Pumps, fans and electrical off-peak tariff, list each energy for lighting additional standing characteristics of the st	ystem 1 ystem 2 lary er fuel) c keep- ch of (23 rges (Ta	hot 30a) to (: able 12) (253) ar	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44 Table 12a 43.82 120	(2 (2 (2 (2 (2 (2 (2 (2
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electrical off-peak tariff, list each energy for lighting	ystem 1 ystem 2 lary er fuel) c keep- ch of (23 rges (Ta at lines	hot 30a) to (2 able 12) (253) areating sy	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	332.22 Fuel Cost £/year 74.65 0 0 76.74 1.33 25.44 Table 12a 43.82 120	(2 (2 (2 (2 (2 (2 (2 (2

83.45 12a. CO2 emissions – Individual heating systems including micro-CHP **Energy Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year (211) x Space heating (main system 1) (261)0.216 463.32 Space heating (secondary) (215) x (263)0.519 0 Water heating (219) x 476.32 (264)0.216 (261) + (262) + (263) + (264) =Space and water heating (265)939.64 (221) x Space cooling 0.519 5.22 (266)Electricity for pumps, fans and electric keep-hot (231) x (267)0.519 100.09 (232) x Electricity for lighting (268)0.519 172.42 sum of (265)...(271) = Total CO2, kg/year 1217.38 (272)CO2 emissions per m² $(272) \div (4) =$ (273)16.01 El rating (section 14) (274)87 13a. Primary Energy **Energy Primary** P. Energy kWh/year factor kWh/year (211) x Space heating (main system 1) (261)1.22 2616.9 (215) x Space heating (secondary) (263)3.07 0 Energy for water heating (219) x2690.34 (264)1.22 (261) + (262) + (263) + (264) =Space and water heating (265)5307.24 (221) x Space cooling (266)3.07 30.89 (231) x Electricity for pumps, fans and electric keep-hot 3.07 592.06 (267)(232) x Electricity for lighting 0 1019.91 (268)sum of (265)...(271) ='Total Primary Energy (272)6950.09

 $(272) \div (4) =$

SAP rating (Section 12)

Primary energy kWh/m²/year

(273)

91.38

(258)

		l	Jser D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	12		Stroma Softwa	re Ver	sion:			016363 on: 1.0.4.10	
A ddraga .		Pro	perty A	Address:	Flat 2-1	l-Lean				
Address: 1. Overall dwelling dim	ensions:									
			Area	ı(m²)		Av. He	ight(m)		Volume(m³)	
Basement			7-	4.06	(1a) x	2	2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	7.	4.06	(4)			-		_
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:										
		econdary neating		other		total			m³ per hou	•
Number of chimneys	0 +	0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0	Ī = Ē	0	x 2	20 =	0	(6b)
Number of intermittent fa	ans					0	x ′	10 =	0	
Number of passive vent	S				F	0	x [,]	10 =	0	 (7b)
Number of flueless gas	fires					0	X 4	40 =	0	 ☐(7c)
· ·					L					」` ′
								Air ch	anges per ho	ur
Infiltration due to chimne						0		÷ (5) =	0	(8)
If a pressurisation test has Number of storeys in	been carried out or is intendent the dwelling (ps)	ed, proceed to	o (17), c	otherwise c	ontinue fr	om (9) to ((16)			7(0)
Additional infiltration	the dwelling (hs)						[(9)	-1]x0.1 =	0	(9) (10)
	0.25 for steel or timber	frame or 0.	.35 for	masonr	y constr	uction	[(0)	. p.o	0	(11)
	present, use the value corres	sponding to th	ne greate	er wall area	a (after					
deducting areas of open	ings); if equal user 0.35 floor, enter 0.2 (unsea	led) or 0.1	مادمی)	رام (ام	antar ()					(12)
If no draught lobby, er	•	ieu) oi o. i	(Scale	u), else	eriter o				0	(13)
• .	vs and doors draught s	tripped							0	(14)
Window infiltration	3			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value	, q50, expressed in cub	oic metres	per ho	ur per so	quare m	etre of e	nvelope	area	3	(17)
If based on air permeab	ility value, then $(18) = [(1$	7) ÷ 20]+(8),	otherwi	se (18) = (16)				0.15	(18)
	es if a pressurisation test ha	s been done o	or a deg	ree air per	meability	is being u	sed			_
Number of sides shelter Shelter factor	ed			(20) = 1 - [0.075 x (1	9)1 =			2	(19) (20)
Infiltration rate incorpora	ating shelter factor			(21) = (18)		-/1			0.85](20)](21)
Infiltration rate modified	-	4		, , , ,	, ,				0.13	(21)
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind s									l	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (20a) (6	22)m · 4								-	
Wind Factor $(22a)m = (22a)m = 1.27$ 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
1.27	1.20 1.1 1.00	0.00	5.55	0.02	'	1.00	L '. ' L	L '. 10	I	

Adjusted infiltration r	ate (allow	ing for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective a	•	rate for t	he appli	cable ca	se						_	
If mechanical vent		and the N. (O	10l-) (00-			NIE\\ - (l) (00-)			0.5	(23a
If exhaust air heat pur			, ,	,	. `	,, .	,	o) = (23a)			0.5	(23b
If balanced with heat re	-	-	_								76.5	(230
a) If balanced med		1	.	1	- 	- ^ ` -	ŕ	r ´ `		- ` `) ÷ 100] ¬	40.4
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a
b) If balanced med			ı —		, , `	, ``	í `	, 		1	٦	
(24b)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole house of if (22b)m < 0.5			•					5 v (23h	2)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0	1	(240
d) If natural ventila	tion or wh	nole hous	se positiv	ve input	ventilati	on from	loft				_	
if (22b)m = 1,			•	•				0.5]				
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(240
Effective air chang	e rate - e	nter (24a) or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and	heat loss	paramete	er.									
ELEMENT Gr	oss a (m²)	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-valu kJ/m²·		A X k kJ/K
Doors	,			2.6	x	1.2		3.12	$\stackrel{'}{\Box}$			(26)
Windows Type 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	=			(27)
Windows Type 2				3.95	〓 .	/[1/(1.2)+	· 0.04] =	4.52	=			(27)
Windows Type 3				5.51		/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type 4				0.65	二 .	/[1/(1.2)+	· 0.04] =	0.74	=			(27)
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7.78	20.58	8	47.2	=			7.08	-		\neg	(29)
Walla Tura O	4.47	2.6		21.87		0.15		3.28	북 ¦		룩 늗	(29)
-	.93	0	_	5.93	=	0.15	-	0.89	<u>-</u>		႕	(29)
Total area of elemen					=	0.15		0.09	[
	13, 111			98.18	=							(31)
Party floor				12.38	=	0	=	0	<u> </u>		┥	(32)
Party floor				74.06	=				Ĺ		╡	(32a
Party ceiling				74.06					[(32b
* for windows and roof wi ** include the areas on bo					lated using	g formula :	/[(1/U-valu	ie)+0.04] a	as given in	n paragrapi	h 3.2	
Fabric heat loss, W/I	< = S (A x	(U)				(26)(30) + (32) =				37.93	(33)
Heat capacity Cm =	S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	27828.4	(34)
Thermal mass paran	notor (TM	P = Cm -	- TFA) ir	n kJ/m²K			Indica	ntive Value	: Medium		250	(35)
mormar made parar	ierei (i ivii	·	,									
For design assessments can be used instead of a	where the de	etails of the	,	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
For design assessments	where the de	etails of the culation.	construct		•	recisely the	e indicative	e values of	f TMP in Ta	able 1f	11.04	(36)

Total fabric heat loss						(22) 1	(36) =			40.07	7(27)
Ventilation heat loss calcula	ed monthl	V				` '	, ,	25)m x (5)		48.97	(37)
Jan Feb Ma		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.8 17.59 17.3		16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat transfer coefficient, W/	_ K	!	<u>!</u>	<u>!</u>	!	(39)m	= (37) + (37)	1 38)m	<u> </u>		
(39)m= 66.77 66.57 66.3	1	65.15	64.14	64.14	63.93	64.54	65.15	65.55	65.96		
	!	1			1		Average =	Sum(39) ₁ .	12 /12=	65.3	(39)
Heat loss parameter (HLP),	1	1	T	T	T	· · ·	= (39)m ÷	`		1	
(40)m= 0.9 0.9 0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89	0.00	7(40)
Number of days in month (T	able 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Jan Feb Ma	r Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31	30	31	30	31	31	30	31	30	31		(41)
	-	-			-					'	
4. Water heating energy re	quirement:								kWh/ye	ear:	
Assumed occupancy N									0.4		(42)
Assumed occupancy, N if TFA > 13.9 , N = $1 + 1.7$	6 x [1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		34		(42)
if TFA £ 13.9, $N = 1$										1	
Annual average hot water us Reduce the annual average hot wa	•	•		_	` ,		se target o		.79		(43)
not more that 125 litres per person			•	-	to domovo	a water ac	o largot o	,			
Jan Feb Ma	r Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day fo							<u> </u>	<u> </u>			
(44)m= 98.77 95.17 91.5	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
	·			_				m(44) ₁₁₂ =		1077.45	(44)
Energy content of hot water used -	calculated m	onthly = 4 .	190 x Vd,ı	n x nm x L	i) kWh/mor	nth (see Ta		c, 1d)	l	
(45)m= 146.47 128.1 132.	9 115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		7
If instantaneous water heating at p	oint of use (n	o hot wate	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
(46)m= 21.97 19.22 19.8	3 17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water storage loss:					<u> </u>		<u> </u>				
Storage volume (litres) inclu	ding any s	olar or W	WHRS	storage	within sa	ame ves	sel		0		(47)
If community heating and no		•			, ,						
Otherwise if no stored hot w	ater (this i	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
Water storage loss: a) If manufacturer's declare	d loss fact	or is kno	wn (k\/\/l	n/day)·					0		(48)
Temperature factor from Tal		01 10 11110	(1000)	i, aay j.					0		(49)
Energy lost from water stora		ear			(48) x (49)) <u>=</u>			0		(50)
b) If manufacturer's declare			or is not		(10) X (10)	, –			U		(50)
Hot water storage loss facto		le 2 (kW	h/litre/da	ay)					0		(51)
If community heating see se										ı	<i>1</i> >
Volume factor from Table 2a Temperature factor from Tal									0		(52)
•		oor			(A7) v (E4)	\ v (EQ) = (52) –		0		(53)
Energy lost from water stora Enter (50) or (54) in (55)	ge, kvvn/y	c ai			(47) x (51)) X (OZ) X (JJ) =	-	0		(54) (55)
(-3) (-3) (-3)									_		()

Water storag	e loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary circu	,	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat re	quired for	water he	eating ca	alculated	l for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW inpu	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)		_			
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	vater hea	iter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	-		-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	00.7	1		ĺ		i		()
	1	00.02	49.17	47.52	41.09	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include (57)m in cal		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		l eating	(65)
include (57	•	culation (of (65)m	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		neating	(65)
,	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal of Metabolic ga	ns (Table	culation of Table 5	of (65)m and 5a	only if c	ı :ylinder i:	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. Internal of Metabolic ga	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
5. Internal of Metabolic ga Jan (66)m= 140.43	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	neating	
5. Internal of Metabolic ga Metabolic ga Jan (66)m= 140.43	ns (Table Feb 140.43 s (calcula 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec 140.43	neating	(66)
5. Internal of Metabolic gardinal Jan (66)m= 140.43 Lighting gain (67)m= 46.04	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec 140.43	eating	(66)
5. Internal of Metabolic games Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
5. Internal of Metabolic game Metabolic game Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances game (68)m= 308.33	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	neating	(66) (67)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38 ans gains 3	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio 93.62 g gains (T. 79.68	culation of the Coulati	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)
5. Internal (Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin (72)m= 82.37	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62 g gains (Table 79.68 all gains =	culation of the Coulati	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

		<u>_</u>									_				
Southwest _{0.9}	• • • • • • • • • • • • • • • • • • • •	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.5	(79)
Southwest _{0.9}	0.77	X	0.6	65	X	9	2.85]		0.24	X	0.7	=	7.0	3 (79)
Southwest _{0.9}	0.77	X	5.5	51	X	6	9.27]		0.24	X	0.7	_	44.4	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x	6	9.27]		0.24	X	0.7	=	5.2	4 (79)
Southwest _{0.9}	0.77	X	5.5	51	x	4	4.07]		0.24	X	0.7		28.2	(79)
Southwest _{0.9}	0.77	х	0.6	35	x	4	4.07			0.24	X	0.7	=	3.3	4 (79)
Southwest _{0.9}	0.77	x	5.5	51	x	3	1.49] [0.24	X	0.7	-	20.	2 (79)
Southwest _{0.9}	0.77	X	0.6	65	x	3	1.49			0.24	X	0.7	_	2.3	8 (79)
Solar gains i	n watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m			_	
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains -	- internal a	and solar	r (84)m =	= (73)m	+ (8	33)m	, watts					-		_	
(84)m= 583.2	7 616.8	643.65	671.25	687.23	66	67.49	637.02	607	.57	580.4	557.88	552.01	561.6		(84)
7. Mean int	ernal tem	perature	(heating	season)										
Temperatu	re during l	neating p	eriods ir	n the livi	ng a	area 1	from Tal	ole 9,	, Th	1 (°C)				21	(85)
Utilisation f	actor for g	ains for	living are	ea, h1,m	(Se	ee Ta	ble 9a)								
Jan	Feb	Mar	Apr	May	Ì,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 0.99	0.99	0.97	0.92	0.8		0.6	0.44	0.4	18	0.73	0.93	0.98	0.99	7	(86)
Mean interr	nal tempe	rature in	living an	ea T1 (fo	יחורי	w ste	ns 3 to 7	7 in T	able	9c)		1		_	
(87)m= 20.29		20.55	20.77	20.93	_	0.99	21	2	$\overline{}$	20.97	20.79	20.51	20.27	٦	(87)
` ′		<u> </u>	<u> </u>	<u> </u>				l bla (<u> </u>	_	
Temperatur (88)m= 20.17		20.17	20.18	20.18	_	eiiing 20.2	20.2	20.		20.19	20.18	20.18	20.18	7	(88)
` ′		l	L	L			l	l	· <u>-</u>	20.10	20.10	20.10	20.10		(00)
Utilisation f	 	1	1	· · ·			·	–				1		7	(00)
(89)m= 0.99	0.98	0.96	0.9	0.75		0.53	0.36	0.4	4	0.66	0.91	0.98	0.99		(89)
Mean interr	nal tempe	rature in	the rest	of dwell	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)		•	_	
(90)m= 19.23	3 19.37	19.61	19.92	20.12	2	0.19	20.2	20.	.2	20.17	19.95	19.56	19.21		(90)
										f	LA = Liv	ing area ÷ (4) =	0.2	6 (91)
Mean interr	nal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 19.5	19.63	19.86	20.14	20.33	2	20.4	20.41	20.4	41	20.38	20.17	19.81	19.48		(92)
Apply adjus	tment to t	he mear	interna	temper	atu	re fro	m Table	4e,	whe	re appro	priate			_	
(93)m= 19.35	19.48	19.71	19.99	20.18	2	0.25	20.26	20.2	26	20.23	20.02	19.66	19.33		(93)
8. Space he	eating req	uirement													
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	∈(76)m an	d re-ca	lculate	
the utilisation		Mar	Apr	1	Г	Jun	Jul	Ι		Sep	Oct	Nov	Dec		
Utilisation f		!	<u> </u>	May	<u></u>	Jun	Jui	A	ug	Sep	Oct	INOV	Dec		
(94)m= 0.98		0.96	0.89	0.75).54	0.37	0.4	11	0.66	0.9	0.97	0.99	٦	(94)
Useful gain	!	<u> </u>										1 3.3.		_	, ,
(95)m= 574.4		615.04	599.35	517.71	35	58.89	234.26	246	.17	383.66	502.03	536.04	554.54	.]	(95)
Monthly av	erage exte	ernal tem	perature	from T	able	e 8	I.				I	1		_	
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	7	(96)
Heat loss ra	ate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(93	3)m-	- (96)m]			- -	
(97)m= 1005.1	19 970.84	876.43	725	552.42	36	52.36	234.52	246	.65	395.59	613.8	823.19	998.22	:	(97)
														-	

	320.5	247.57	194.48	90.47	25.83	0	0	0	0	83.16	206.75	330.1		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1498.86	(98
Space	e heatin	g require	ement in	kWh/m²	/year								20.24	— (99
		oling req			•							L		
		r June, J			See Tab	ole 10h								
ou.ou	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	oss rate	Lm (ca	lculated	using 25	°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
00)m=	0	0	0	0	0	602.87	474.6	485.89	0	0	0	0		(10
Jtilisa	tion fac	tor for lo	ss hm		-					r	r			
01)m=	0	0	0	0	0	0.92	0.97	0.95	0	0	0	0		(10
		mLm (V			<u> </u>					1				44
02)m=			0	0	0	555.88	458.15	462.2	0	0	0	0		(10
							egion, se							(1)
03)m=		0	0	0 r manth	0	706.39	673.64	637.8	(h) 0.0	0	0	0 102\m 1	(11)m	(1)
		g require zero if (weiling,	continuo	ous (Kvv	(n) = 0.0	24 X [(10)3)m – (נ [102)m	((41)m	
04)m=	0	0	0	0	0	108.37	160.32	130.65	0	0	0	0		
ļ									Total	= Sum(104)	=	399.33	(1
ooled	I fraction	า							f C =	cooled	area ÷ (4	1) =	0.6	(1
		actor (Ta	able 10b											_
06)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
	ممانمم				(404)	(405)	(400)	_	Tota	l = Sum((104)	= [0	(1
07)m=		requirer 0	nent for	month =	(104)m	x (105) 16.28	× (106)r	19.63	0	0	0	0		
<i>51)</i> 111–	Ů	Ů	Ů	Ů	Ů	10.20	200	10.00		l = Sum(=		\neg_{a}
220	cooling	roquiror	nant in l						1 ()1(21)				50.00	1(1)
pace	cooming	requirer		$\Lambda h/m2/s$	/ear					,	18087)	_ [59.99	(1)
Гю		•		:Wh/m²/y		rata maa ii		i C	(107)) ÷ (4) =	18087)	_ [0.81	┥`
	<u> </u>	quiremer		-		/stems i	ncluding	micro-C	(107)	,	19,487	_ [(1)
Spac	e heatir	quiremer ng:	ıts – Indi	vidual h	eating sy		<u> </u>	micro-C	(107)	,	iauar j	- [0.81	(1
Space racti	e heatir on of sp	quiremer ng: pace hea	nts – Indi	vidual h	eating sy		system		(107) CHP)	,	Takker)	_ [0.81	(1
Space racti racti	e heatir on of sp on of sp	quirements ng: bace head bace head	nts — Indi nt from se nt from m	vidual h	eating sy y/supple em(s)		system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Tawar)	_ [[[0.81	(1)
Space Fracti Fracti Fracti	e heatir on of sp on of sp on of to	quirement ng: pace hea pace hea tal heatin	nts - Indi	vidual he econdary nain syst main sys	eating sy y/supple em(s) stem 1		system		(107) CHP) - (201) =) ÷ (4) =	Tawar y		0.81 0 1	(1)
Space Fracti Fracti Fracti Efficie	e heatir on of sp on of sp on of to ency of r	quirement ng: pace heat pace heat tal heatin main spa	its – Indi it from so it from m ing from it ace heati	vidual hi econdary nain syst main systing syste	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Takar)		0 1 1 89.5	(2 (2 (2 (2
Space Fracti Fracti Fracti Efficie	e heatire on of spon of spon of to ency of spon of spo	quirement ng: pace heat pace heat tal heatin main spa	ats - Indi	vidual he econdary nain syst main systemain systementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Tasser)		0.81 0 1	(1) (2) (2) (2) (2) (2)
Space Fracti Fracti Fracti Efficie	e heatire on of spon of spon of to ency of spon of spo	quirement ng: pace heat pace heat tal heatin main spa	ats - Indi	vidual he econdary nain syst main systemain systementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Table)		0 1 1 89.5	(1) (2) (2) (2) (2) (2)
Space Fracti Fracti Fracti Efficie	e heatire on of spon of spon of to ency of spon of spo	quirement ng: pace heat pace heat tal heatin main spa	ats - Indi	vidual he econdary nain syst main systemain systementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Nov		0 1 1 89.5	(2) (2) (2) (2) (2) (2)
Space Fracti Fracti Efficie Efficie Coolir	e heatir on of sp on of to ency of r ency of s ng Syste Jan e heatin	uiremen ng: pace hea pace hea tal heatii main spa seconda em Ener Feb g require	ats – Indi at from so at from m ace heati ry/supple gy Efficie Mar ement (c	vidual hecondary nain systemain systementary ementary ency Rate	y/supple em(s) stem 1 em 1 y heating tio May d above)	mentary g system Jun	system	(202) = 1 - (204) = (204)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	Dec	0.81 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2)
Space Fracti Fracti Efficie Efficie Coolir	e heatir on of sp on of to ency of r ency of s ng Syste	uiremen ng: pace hea pace hea tal heatin main spa seconda em Energ	its – Indi it from so it from m ing from it ace heati ry/supple gy Efficie Mar	vidual he econdary nain systemain systemain systementary ementary ency Rat	eating sy y/supple em(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 - (204) = (204)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] =			0.81 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2)
Fracti Fracti Fracti Efficie Efficie Coolir	e heatir on of sp on of to ency of r ency of s ng Syste Jan e heatin 320.5	uiremen ng: pace hea pace hea tal heatii main spa seconda em Ener Feb g require	ats – Indicate from many f	econdary nain systemain systementary ency Rate Apr alculated	y/supple em(s) stem 1 em 1 y heating tio May d above)	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (204)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	Dec	0.81 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2)
Fracti Fracti Fracti Efficie Efficie Coolir	e heatir on of sp on of to ency of r ency of s ng Syste Jan e heatin 320.5	pace head pace head tal heating main special em Energy Feb g requires 247.57	ats – Indicate from many f	econdary nain systemain systementary ency Rate Apr alculated	y/supple em(s) stem 1 em 1 y heating tio May d above)	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 83.16	Nov 206.75	Dec 330.1	0.81 0 1 1 89.5 0 4.73	(1 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Fracti Fracti Fracti Efficie Efficie Coolir	e heatir on of sp on of sp on of to ency of se ency of se g Syste Jan e heatin 320.5	uiremen ng: pace hea pace hea tal heatin main spa seconda em Ener Feb g require 247.57)m x (20	ats – Indicate from many from the from	vidual hecondary nain systemain systementary ency Rate Apr alculated 90.47	y/supple em(s) stem 1 em 1 y heating tio May d above) 25.83	mentary g system Jun	system 1, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 83.16	Nov 206.75	Dec 330.1	0.81 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Space Fracti Fracti Efficie Efficie Coolin Space 11)m	e heating on of spon of to ency of a spon of s	representation of the property	ats – Indiate from set from many from the from t	econdary nain systemain systemain systementary ency Rate Apr alculated 90.47 00 ÷ (20 101.08	y/supple em(s) stem 1 em 1 y heating tio May d above) 25.83	mentary g system Jun	system 1, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 83.16	Nov 206.75	Dec 330.1	0 1 1 89.5 0 4.73 kWh/ye	(1 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Fracti Fracti Fracti Efficie Efficie Coolin Space	e heating on of spon of to ency of a spon of s	requirements pace head tal heating the secondar the seco	ats – Indiate from set from many from the from t	econdary nain systemain systemain systementary ency Rate Apr alculated 90.47 00 ÷ (20 101.08	y/supple em(s) stem 1 em 1 y heating tio May d above) 25.83	mentary g system Jun	system 1, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 83.16	Nov 206.75	Dec 330.1	0 1 1 89.5 0 4.73 kWh/ye	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2

Output from water hea	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18	1	
Efficiency of water hea						1				1.52	89.5	(2
217)m= 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(2
uel for water heating,					•	•	•		•	•	•	
$(219)m = (64)m \times 100$ $(219)m = (219.89) \times 192.08$) ÷ (217) 199.84	m 177.25	171.61	151.14	144.81	161.43	163.21	185.85	198.39	214.72	1	
,							l = Sum(2				2180.21	(2
Space cooling fuel, k		nth.										_
$ 221)m = (107)m \div (209) $ $ 221)m = 0 $	9) 0	0	0	3.45	5.1	4.15	0	0	0	0	1	
221)111= 0 0	0	U	0	3.45	5.1		I = Sum(2)				12.7	(22
Annual totals									Wh/yeaı	•	kWh/yea	
Space heating fuel use	ed, main	system	1						, y ou.		1674.7	
Water heating fuel use	d										2180.21	
Space cooling fuel use	d										12.7	Ī
Electricity for pumps, fa	ans and	electric	keep-ho	t								_
mechanical ventilation	n - balan	ced, ext	ract or p	ositive i	nput fror	n outside	Э			158.57	1	(23
central heating pump:	•									30	j	(23
Total electricity for the	above, k	kWh/yea	ır			sum	of (230a).	(230g) =	:		188.57	(23
						ouiii	0. (=000).	\ 0/			100.57	(
Electricity for lighting						oam	o. (200a).	(0,			325.25	= '
Electricity for lighting 10a. Fuel costs - indiv		·					. (2004).					= '
Electricity for lighting 10a. Fuel costs - indiv		·		E	an l		. (2008).				325.25	(23
		·		Fu kW	i el Vh/year	ou	J. (2003)	Fuel P (Table	rice			(23
10a. Fuel costs - indiv	vidual he	eating sy		kW			J. (2003)	Fuel P	Price 12)	x 0.01 =	325.25	(23
10a. Fuel costs - indiv	vidual he	eating sy		kW (21	/h/year		J. (2003)	Fuel P (Table	Price 12)	x 0.01 = x 0.01 =	325.25 Fuel Cost £/year	(23
10a. Fuel costs - indiv Space heating - main s Space heating - main s	vidual he system 1 system 2	eating sy		kW (21:	/h/year 1) x			Fuel P (Table	Price 12)		325.25 Fuel Cost £/year 58.28	(23
10a. Fuel costs - indiv Space heating - main s Space heating - main s Space heating - secon	vidual he system 1 system 2 dary	eating sy		kW (21:	/h/year 1) x 3) x 5) x			Fuel P (Table	Price 12) 18	x 0.01 =	325.25 Fuel Cost £/year 58.28	(24
Space heating - main some space heating - main some space heating - second water heating cost (other)	vidual he system 1 system 2 dary	eating sy		(21:	Vh/year 1) x 3) x 5) x			Fuel P (Table 3.4 0 13. 3.4	Price 12)	x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 58.28 0 0 75.87	(23)
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling)	vidual he system 1 system 2 dary ner fuel)	eating sy		(21:	Vh/year 1) x 3) x 5) x 9)			Fuel P (Table 3.4	Price 12) 18 19 18	x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 58.28 0	(23)
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling pumps, fans and electrons)	vidual he system 1 system 2 dary ner fuel) ric keep-	eating sy	stems:	(21: (21: (21: (21: (22: (23:	Vh/year 1) x 3) x 5) x 9) 1)			Fuel P (Table 3.4 0 13. 13. 13.	Price 12) 18 19 19 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 58.28 0 0 75.87 1.67 24.87	(24) (24) (24) (24) (24) (24) (24)
Space heating - main some space heating - main some space heating - main some space heating - second vater heating cost (other space cooling pumps, fans and electric off-peak tariff, list eating to second	vidual he system 1 system 2 dary ner fuel) ric keep-	eating sy	stems:	(21: (21: (21: (21: (22: (23:	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 0 13. 13. 13.	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	325.25 Fuel Cost £/year 58.28 0 0 75.87 1.67 24.87	(2-2-1) (2-2-1
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling pumps, fans and electric off-peak tariff, list eatenergy for lighting	vidual he system 1 system 2 dary ner fuel) ric keep- ich of (23	eating sy	stems: 230g) se	kW (21) (21) (21) (22) (23) eparately	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 58.28 0 0 75.87 1.67 24.87 Table 12a	(22 (24 (24 (24 (24 (24 (24 (24 (24 (24
Space heating - main some space heating - main some space heating - second water heating cost (other space cooling pumps, fans and electrical off-peak tariff, list earnergy for lighting additional standing characters.	vidual he system 2 dary her fuel) ric keep- ich of (23	eating sy -hot 30a) to (able 12)	stems: 230g) se	kW (21) (21) (21) (22) (23) eparately (23)	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app			Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 58.28 0 0 75.87 1.67 24.87 Table 12a 42.9	(22 (24 (24 (24 (24 (24 (24 (24 (24 (24
Space heating - main some space heating - main some space heating - main some space heating - second vater heating cost (other space cooling pumps, fans and electric off-peak tariff, list easenergy for lighting additional standing characteristics.	system 1 system 2 dary ner fuel) ric keep- ach of (23 arges (Tages)	eating sy -hot 30a) to (able 12)	stems: 230g) se	kW (21) (21) (21) (22) (23) eparately (23)	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 58.28 0 0 75.87 1.67 24.87 Table 12a 42.9	(24) (24) (24) (24) (24) (24) (24)
Space heating - main some space heating - main some space heating - main some space heating - second water heating cost (other space cooling pumps, fans and electric off-peak tariff, list earnergy for lighting additional standing characteristic Quitems: report of the standing characteristic probability of the standing charac	vidual here system 1 system 2 dary ner fuel) ric keep- ach of (2: arges (Tages)	eating sy -hot 30a) to (able 12)	stems: 230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app 2) ded	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 58.28 0 75.87 1.67 24.87 Table 12a 42.9 120	(22- (24- (24- (24- (24- (24- (24- (24-
	vidual here system 1 system 2 dary her fuel) ric keep- ach of (23 arges (Taleat lines	eating sy -hot 30a) to (able 12) 5 (253) an	stems: 230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	Vh/year 1) x 3) x 5) x 9) 1) 1) y as app 2) ded	ilicable a		Fuel P (Table 3.4 3.4 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	Price 12) 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	325.25 Fuel Cost £/year 58.28 0 75.87 1.67 24.87 Table 12a 42.9 120	(22) (2-1) (2

SAP rating (Section 12)			84.08 (258)
12a. CO2 emissions – Individual heating system	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	361.74 (261)
Space heating (secondary)	(215) x	0.519	0 (263)
Water heating	(219) x	0.216	470.92 (264)
Space and water heating	(261) + (262) + (263) + (264)	=	832.66 (265)
Space cooling	(221) x	0.519	6.59 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	97.87 (267)
Electricity for lighting	(232) x	0.519 =	168.8 (268)
Total CO2, kg/year	\$	sum of (265)(271) =	1105.92 (272)
CO2 emissions per m ²	((272) ÷ (4) =	14.93 (273)
El rating (section 14)			88 (274)
13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	2043.14 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2659.85 (264)
Space and water heating	(261) + (262) + (263) + (264)	=	4702.99 (265)
Space cooling	(221) x	3.07	38.98 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	578.91 (267)
Electricity for lighting	(232) x	0 =	998.51 (268)
'Total Primary Energy	5	sum of (265)(271) =	6319.39 (272)

 $(272) \div (4) =$

Primary energy kWh/m²/year

(273)

85.33

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	Property	Address	Flat 2-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:								
1. Overall awelling aime	,	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) ====	76.06	(4)			-		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins			Ī	0	x ′	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_			A in a b	ongoo nor he	
	, o flues and force (60) (6b) (70) . (7 b)	(70) -	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		(//				,		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	0.25 for steel or timber frame of the result of the res			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wan are	a (anter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2	v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per ho					area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•				0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	ed		(20) 4	10 07E v (4	10)1			3	(19)
Shelter factor	ting chalter feater		(20) = 1 - (21) = (18)		19)] =			0.78	(20)
Infiltration rate incorpora Infiltration rate modified to	•		(21) = (10	/ X (20) =				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	1 3		1	1 -		l	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) == (2	2)m · 4	-			-	-		-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
(-24)	1 0.99	1 0.00	1 3.02		L	12	Lo	J	

0.15	0.15	0.14	0.13	0.12	0.11	0.11	(21a) x	0.12	0.12	0.13	0.14	1		
alculate effec		_	rate for t	he appli	cable ca	se			ļ			J 		_
If mechanica				(. (00)	\ (22.\				0.5	(2:
If exhaust air he) = (23a)				0.5	(23
If balanced with		-	•	_									6.5	(23
a) If balance				i		- 	- 	í `	r Ó - Ò		' ' ') ÷ 100] 7		(2
4a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J		(2
b) If balance				ı			- ^ ` ` - 	ŕ	r Ó		Ι ,	7		(2
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse ext n < 0.5 ×			•	•				5 v (23h	.)				
4c)m = 0	0.5 \(\)	0	0	0	0	0	0	1 0	0	0	0	1		(2
d) If natural		n or wh	ole hous	e nositi	/e input	ventilati	on from	loft				J		•
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
Effective air	change i	rate - er	nter (24a	or (24l	o) or (24	c) or (24	ld) in bo	x (25)				-		
5)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]		(2
B. Heat losse	s and he	at loss r	naramete	or.								_		
LEMENT	Gros	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
	area	_								•				
	arca	(1112)	m)²	A ,r	n²	W/m2	2K	(W/ł	<)	kJ/m²•	K	KJ	/K
oors	arca	(1112)	rr) *	A ,r	m² x	W/m2	2K =	(VV/F 3.12	<) 	kJ/m²•	K	KJ	
		(1112)	rr] *		x		=	` `	<) 	kJ/m²•	K	KJ	(2
indows Type	: 1	(111-)	rr	 4	2.6	x x1	1.2	= 0.04] =	3.12	<) 	kJ/m²-	K	KJ	(2
indows Type indows Type	e 1 e 2	(III -)	rr	 	3.26	x1 x1 x1	1.2 /[1/(1.2)+	= (0.04] = (0.04] =	3.12	<) 	kJ/m²-	K	КJ	(2 (2 (2
indows Type indows Type indows Type	e 1 e 2 e 3	(III -)	rr	 	2.6 3.26 3.95	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<) 	kJ/m²-	K	КJ	(2 (2 (2
indows Type indows Type indows Type indows Type	e 1 e 2 e 3		20.56		2.6 3.26 3.95 5.51	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31	<)	kJ/m²-	ĸ	КJ	(2)
indows Type indows Type indows Type indows Type alls Type1	2 2 3 4	4			2.6 3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	<)	kJ/m²-	K	KJ	(2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4 38.14	4 2	20.56		2.6 3.26 3.95 5.51 0.65 17.56	x1 x1 x1 x1 x1 x1 x1 x2 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63	<)	kJ/m²-	K 	KJ	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
indows Type indows Type indows Type indows Type alls Type1 alls Type2	23.92 3.14 23.92 5.95	4 2	20.56		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	x x1 x1 x1 x1 x1 x1 x1 x2 x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89		kJ/m²-	K 	KJ	(2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2		kJ/m²-	K 	KJ	(22 (22 (22 (22 (22 (22 (22 (22 (22 (22
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	()	kJ/m²-	к 	KJ	
findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.57 12.38	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89		kJ/m²-	K 	KJ	(22 (24 (24 (24 (24 (24 (24 (24 (24 (24
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.52 12.38 76.06	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	\$) 	kJ/m²-	K 	KJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor arty ceiling or windows and	23.92 38.14 23.92 5.95 29.5	4 2 3 1 m ²	20.56 2.6 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				KJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area	23.92 23.92 23.92 23.92 29.52 29.52 29.52 29.52 29.52	4 2 1 1 m ² ows, use e	20.5i 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				7.84	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area fabric heat los	23.92 38.14 23.92 5.95 29.57 29.57 29.67 29.	4 2 1 1 m ² ows, use e sides of ir = S (A x	20.5i 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	as given in	n paragrapi	h 3.2		
findows Type findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of earty wall earty floor earty ceiling for windows and include the area fabric heat los eat capacity formal mass	23.92 23.92 23.92 23.92 29.57 29	4 2 1 1 m ² ows, use e sides of ir = S (A x A x k)	20.50 2.6 0 0 effective winternal walk	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.35 76.06 76.06 alue calculatitions	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		n paragrapi	h 3.2	7.84	(2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (

o) If manufacturer's declared cylinder loss factor is not known: ot water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 olume factor from Table 2a	مط مدناهاناهم	eat loss	ء معمل بماء	والطاهرة ممرا						(36) =	OE) ·- (E)		48.84	(3
									` '		<u> </u>			
eat transfer coefficient, W/K 39/m		+		•	,			Ť			-			(0
Section Sect	8)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
Average Sum(39)	eat transfer	coefficier	ıt, W/K						(39)m	= (37) + (38)m			
eat loss parameter (HLP), W/m²K (40)m= (39)m + (4) (39)m = (39)m + (4) (40)m = (39)m + (4) (40)m = (39)m + (4) (40)m = (39)m + (4) (40)m = (39)m + (4)m = (30)m (40)m = (39)m + (4)m = (30)m (40)m = (39)m + (4)m = (30)m (40)m = (39)m + (4)m = (30)m = (30)m = (30)m = (30)m (40)m = (39)m + (4)m = (30)m =	9)m= 66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		_
Olme 0.87 0.87 0.87 0.85 0.85 0.85 0.84 0.84 0.84 0.84 0.85 0.86 0.86 0.86 Average = Sum(40), .v./12= 0.85 Umber of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan		t (I	II D\ \\\	/ 21 <i>/</i>								12 /12=	64.8	(3
Average = Sum(40)/12= 0.85 umber of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 1)m= 31		1 `			0.05	0.04		0.04	· ,		·	0.00		
umber of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	U.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84					0.05	<u> </u>
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 31 28 31 30	umber of da	vs in mor	nth (Tab	le 1a)					,		Sum(40) ₁	12 / 1 Z=	0.85	(-
## Water heating energy requirement: ## Water heating energy late of the water usage in litres per day (d), average energy on the representation of water storage), enter 0 in boxes (46) to (61) ## Water storage loss: ## Water heating energy late heating late heating energy late heating late heating late heating late heating late heating late heating late heating late heating late heating late heating late heating late heati		<u> </u>			Mav	Jun	Jul	Aug	Sen	Oct	Nov	Dec		
### Water heating energy requirement: ### Summed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 **Think		+		•	,		_	Ť			-			(4
ssumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 nnual average hot water usage in litres per day Vd, average = (25 x N) + 36 golduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling and not tark in and the dwelling and not the water use target of the dwelling and the dwelling and the dwelling and the dwelling and the dwelling and the twelli	,				_									•
ssumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 nnual average hot water usage in litres per day Vd, average = (25 x N) + 36 golduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the order of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling is designed to achieve a water use target of the dwelling and not tark in and the dwelling and not the water use target of the dwelling and the dwelling and the dwelling and the dwelling and the dwelling and the twelli												1300/		
if TFA > 13.9, N = 1 + 1.76 × [1 - exp(-0.000349 × (TFA -13.9)2)] + 0.0013 × (TFA -13.9) if TFA £ 13.9, N = 1 nnual average hot water usage in litres per day Vd, average = (25 × N) + 36 poduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of the more that 125 litres per person per day (all water use, hot and cold) Jan	i. vvater nea	iting ener	gy requi	rement:								Kvvn/yea	ar:	
if TFA £ 13.9, N = 1 nnual average hot water usage in litres per day Vd,average = (25 x N) + 36 go.82 at more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec of water usage in litres per day for each month Vd,m = factor from Table 1c x (43) 4)m= 99.9 96.27 92.63 89 85.37 81.73 81.73 85.37 89 92.63 96.27 99.9 Total = Sum(44) = 1089.8 heregy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) shift to be storage loss: corage volume (litres) including any solar or WWHRS storage within same vessel community heating and no tank in dwelling, enter 110 litres in (47) therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) atter storage loss: of the properties of the desired cylinder loss factor is known (kWh/day): of the more that 125 litres per day for each month Vd, m = factor from Table 2b of the more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 10 Nov Dec												.38		(4
anual average hot water usage in litres per day Vd, average = (25 x N) + 36 go.82 standard the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of the more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec of water usage in litres per day for each month Vd,m = factor from Table 1c x (43) 4)m= 99.9 96.27 92.63 89 85.37 81.73 81.73 85.37 89 92.63 96.27 99.9 Total = Sum(44)v= 1089.8 Pergy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) Som= 148.15 129.57 133.7 116.57 111.85 96.52 89.44 102.63 103.86 121.03 132.12 143.47 Total = Sum(45)v= 1428.9 Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Som= 22.22 19.44 20.06 17.48 16.78 14.48 13.42 15.39 15.58 18.16 19.82 21.52 after storage loss: Occommunity heating and no tank in dwelling, enter 110 litres in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) therewise if no stored hot water storage, kWh/year (48) x (49) = 0 Occommunity heating see section 4.3 olume factor from Table 2b occommunity heating see section 4.3 olume factor from Table 2b occommunity heating see section 4.3 occommunity heating see section 4.3 occommunity heating see section 4.3			+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
water use target of the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of timore that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec of water usage in litres per day for each month Vd,m = factor from Table 1c x (43) Jun = 99.9 96.27 92.63 89 85.37 81.73 81.73 85.37 89 92.63 96.27 99.9 Total = Sum(44)		•	tor	ra in litra	a nor de	w.Vd ov	orogo	(25 v NI)	. 26					,
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										se target o		0.82		(4
th water usage in litres per day for each month Vd,m = factor from Table 1c x (43) A	t more that 125	ī litres per p	erson per	day (all w	ater use, l	hot and co	ld)							
### ### ### ### ### ### ### ### ### ##	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Total = Sum(44)	ot water usage	in litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
148.15 129.57 133.7 116.57 111.85 96.52 89.44 102.63 103.86 121.03 132.12 143.47	4)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
148.15 129.57 133.7 116.57 111.85 96.52 89.44 102.63 103.86 121.03 132.12 143.47	<u> </u>						•		-	Γotal = Su	m(44) ₁₁₂ =	=	1089.8	(4
Total = Sum(45) ₁₁₂ = 1428.9 instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) instantaneous value 19.82 21.52 instantaneous val	nergy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600	kWh/mor	th (see Ta	ables 1b, 1	c, 1d)		
instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Sim=	5)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
ater storage loss: community heating and no tank in dwelling, enter 110 litres in (47) therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) ater storage loss: If manufacturer's declared loss factor is known (kWh/day): Image: apperature factor from Table 2b In gray lost from water storage, kWh/year If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day)										Γotal = Su	m(45) ₁₁₂ =	=	1428.9	(4
ater storage loss: orage volume (litres) including any solar or WWHRS storage within same vessel community heating and no tank in dwelling, enter 110 litres in (47) therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) ater storage loss: If manufacturer's declared loss factor is known (kWh/day): Omperature factor from Table 2b Omergy lost from water storage, kWh/year If manufacturer's declared cylinder loss factor is not known: ot water storage loss factor from Table 2 (kWh/litre/day) Community heating see section 4.3 Omperature factor from Table 2a Omperature factor from Table 2b Omperature factor from Table 2b Omperature factor from Table 2b Omperature factor from Table 2b	nstantaneous v	vater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)					
community heating and no tank in dwelling, enter 110 litres in (47) therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) fater storage loss: If manufacturer's declared loss factor is known (kWh/day): Imperature factor from Table 2b Intergy lost from water storage, kWh/year If manufacturer's declared cylinder loss factor is not known: If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day)	*		20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(4
community heating and no tank in dwelling, enter 110 litres in (47) therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) later storage loss: If manufacturer's declared loss factor is known (kWh/day): Imperature factor from Table 2b Imperature factor from water storage, kWh/year If manufacturer's declared cylinder loss factor is not known: If the water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day)	_		مناميياممند		olor or M	WHDC	otorogo	within oc	.m.o. 1/00	- o l				
therwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) later storage loss: If manufacturer's declared loss factor is known (kWh/day): Imperature factor from Table 2b Impergy lost from water storage, kWh/year If manufacturer's declared cylinder loss factor is not known: If water storage loss factor from Table 2 (kWh/litre/day) If water storage loss factor from Table 2 (kWh/litre/day) Imperature factor from Table 2a Imperature factor from Table 2b Imperature factor from Table 2b Imperature factor from Table 2b Imperature factor from Table 2b	J	, ,		•			•		ine ves	sei		0		(4
rater storage loss: If manufacturer's declared loss factor is known (kWh/day): Emperature factor from Table 2b Description of the storage of the storage of the storage of the storage of the storage loss factor is not known: Out water storage loss factor from Table 2 (kWh/litre/day) Community heating see section 4.3 Delume factor from Table 2a Emperature factor from Table 2b Output Outpu	•	•			•			` '	ore) onto	or 'O' in <i>(</i>	47)			
olif manufacturer's declared loss factor is known (kWh/day): emperature factor from Table 2b energy lost from water storage, kWh/year olif manufacturer's declared cylinder loss factor is not known: ot water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 oliume factor from Table 2a emperature factor from Table 2b olimater factor from Table 2b olimater factor from Table 2b olimater factor from Table 2b			not wate	i (uno n	iciuues i	nstantai	ieous co	ilibi boli	ers) erite	, O III (77)			
nergy lost from water storage, kWh/year (48) x (49) = 0) If manufacturer's declared cylinder loss factor is not known: ot water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 olume factor from Table 2a emperature factor from Table 2b o	_		eclared le	oss facto	or is kno	wn (kWł	n/day):					0		(4
nergy lost from water storage, kWh/year (48) x (49) = 0 If manufacturer's declared cylinder loss factor is not known: but water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 blume factor from Table 2a emperature factor from Table 2b 0	•					,	• ,							(4
) If manufacturer's declared cylinder loss factor is not known: ot water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 olume factor from Table 2a emperature factor from Table 2b o	emperature f				ear			(48) x (49)	. =					\ (!
ot water storage loss factor from Table 2 (kWh/litre/day) community heating see section 4.3 clume factor from Table 2a emperature factor from Table 2b 0	•		-	-		or is not		(10) // (10)				0		(•
olume factor from Table 2a emperature factor from Table 2b 0 0	nergy lost fro	turer's de		-								0		(5
emperature factor from Table 2b	nergy lost fro) If manufac			om Tabl	e z (KVVI	, o, ac								
. (47) (47) (47) (47)	nergy lost from If manufactor ot water stor community I	rage loss heating s	factor fr ee section		e z (KVV)	. I, III 0, Ge								
nergy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0	nergy lost from the control of the c	rage loss heating s from Tal	factor fr ee section ble 2a	on 4.3	e z (KVV)	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						0		(!
I I	nergy lost from If manufact ot water stort community be colume factor	rage loss heating s from Tal	factor fr ee section ble 2a	on 4.3	e	. ,								(£

Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	v circuit	loss (an	nual) fro	m Table	3					-		0		(58)
	•	,	,			(59)m = ((58) ÷ 36	65 × (41)	m				_	
(mo	dified by	factor fi	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)		_	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	i loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	50.91	44.31	47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total h	neat requ	uired for	water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DI	HW input of	calculated	using App	endix G oı	· Appendix	ι κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	ı	
(add a	dditiona	l lines if	FGHRS	and/or \	vwhrs	applies	, see Ap	pendix (3)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter	•		•	•	•	•	•	•	•		
(64)m=	199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
								Outp	out from w	ater heate	r (annual) ₁	12	1973.65	(64)
Heat g	ains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	า] + 0.8 ว	k [(46)m	+ (57)m	+ (59)m	1	
(65)m=	61.99	54.16	56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43]	(65)
inclu	ude (57)	m in cald	culation o	of (65)m	only if c	ylinder i	s in the o	dwellina	or hot w	ater is fr	om com	munitv h	ı neating	
	. ,	ains (see			•	,		J				,	<u> </u>	
	Ĭ	·			, .									
Metab	Jan	s (Table Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	143.03	143.03	143.03	143.03	143.03	143.03	143.03	143.03	143.03	143.03	143.03	143.03		(66)
` ,	ng gains	(calcula	L ted in Ar	nendix		ion L9 o	L rl0a)a	<u> </u>	<u> </u>	<u> </u>				
(67)m=	47.03	41.77	33.97	25.72	19.22	16.23	17.54	22.8	30.6	38.85	45.34	48.34		(67)
						uation L	L	l		<u> </u>	1 .0.0 .	1 .0.0 .	l	(-)
Applia (68)m=	314.94	318.21	309.97	292.44	270.31	249.51	235.61	232.34	240.58	258.11	280.24	301.04	1	(68)
			<u> </u>	<u> </u>						ļ	200.24	301.04		(00)
COOKII (69)m=	51.69	51.69	51.69	51.69	L, equal	51.69	51.69	51.69	51.69	51.69	51.69	51.69]	(69)
` '					31.09	31.09	31.09	51.09	31.09	31.09	31.09	31.09		(00)
Pumps (70)m=	and lai	ns gains 3	(Table :		3	3	3	3	3	3	3		1	(70)
				3			3	3	3	٦	٥	3		(10)
		aporatio	<u> </u>		<u> </u>	- 		05.05	05.05	05.05	05.05		1	(74)
(71)m=	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35	-95.35		(71)
		gains (T	· ·			l _	l _			l <u></u>	-	l _	Ī	/=-·
(72)m=	83.31	80.59	75.62	69.07	64.6	58.57	53.97	60.48	63.2	69.95	77.5	81.22		(72)
Total i	internal	gains =				(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7)	1)m + (72))m		
Iotaii		9											1	
(73)m=	547.65 lar gains	542.94	521.92	489.59	456.5	426.67	409.48	417.99	436.74	469.28	505.45	532.97		(73)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	х	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	х	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	X	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	х	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	X	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67		0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	X	62.67		0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	X	85.75		0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	X	85.75		0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	X	106.25		0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25		0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15		0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	X	104.39		0.24	X	0.7	=	66.97	(79)

Southwe	st _{0.9x} 0.	77 X	0.6	65	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwe	st _{0.9x} 0.	77 X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwe	st _{0.9x} 0.	77 ×	0.6	65	X	9	2.85]		0.24	X	0.7	=	7.03	(79)
Southwe	st _{0.9x} 0.	77 ×	5.5	51	x	6	9.27]		0.24	x	0.7	=	44.43	(79)
Southwe	st _{0.9x} 0.	77 ×	0.6	65	x	6	9.27]		0.24	x	0.7	=	5.24	(79)
Southwe	st _{0.9x} 0.	77 X	5.5	51	x	4	4.07			0.24	x	0.7	=	28.27	(79)
Southwe	st _{0.9x} 0.	77 X	0.6	65	x	4	4.07			0.24	x	0.7	=	3.34	(79)
Southwe	st _{0.9x} 0.	77 X	5.5	51	x	3	1.49]		0.24	x	0.7		20.2	(79)
Southwe	st _{0.9x} 0.	77 X	0.6	65	x	3	1.49			0.24	x	0.7		2.38	(79)
															
Solar ga	ains in watts,	calculate	d for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m			_	
(83)m=	45.33 83.5	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total ga	ins – interna	l and sola	r (84)m =	= (73)m	+ (8	33)m	, watts						_	_	
(84)m=	592.98 626.4	4 652.89	679.88	695.21	6	74.9	644.12	614	.78	587.98	566.07	560.89	571.02		(84)
7. Mea	ın internal ter	nperature	(heating	season)										
Tempe	erature during	heating p	periods i	n the livi	ng	area 1	from Tal	ole 9,	, Th	1 (°C)				21	(85)
Utilisat	ion factor for	gains for	living are	ea, h1,m) (S	ee Ta	ble 9a)								
	Jan Fel	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(86)m=	0.99 0.99	0.97	0.92	0.8		0.6	0.43	0.4	17	0.72	0.93	0.98	0.99	1	(86)
∟ Mean i	nternal temp	erature in	living ar	ea T1 (fo	ollo	w ste	ns 3 to 7	7 in T	able	3 9c)			•	4	
_	20.33 20.42		20.79	20.94	_	0.99	21	2		20.97	20.81	20.54	20.31	1	(87)
_	مانسان مانسان				ر الم	ماناه		l bla (2 (90)			<u> </u>	J	
· -	erature during	<u> </u>	20.21	20.21	_	eiiing 0.22	20.22	20.2		20.22	20.21	20.21	20.2	1	(88)
` · L	L		l		<u> </u>			l		ZU.ZZ	20.21	20.21	20.2]	(55)
	ion factor for	Ť	1		$\overline{}$			É				1		1	(00)
(89)m=	0.99 0.98	0.96	0.9	0.75	(0.53	0.36	0.3	89	0.65	0.9	0.98	0.99		(89)
Mean i	nternal temp	erature in	the rest	of dwelli	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			•	
(90)m=	19.31 19.44	19.67	19.97	20.15	2	0.22	20.22	20.2	22	20.2	20	19.62	19.28		(90)
										f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Mean i	nternal temp	erature (fo	or the wh	ole dwe	llin	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m=	19.57 19.69	19.91	20.18	20.35	2	0.41	20.42	20.4	42	20.4	20.21	19.86	19.54]	(92)
Apply a	adjustment to	the mea	n interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate			_	
(93)m=	19.42 19.54	19.76	20.03	20.2	2	0.26	20.27	20.2	27	20.25	20.06	19.71	19.39		(93)
8. Spa	ce heating re	quiremen	t												
	to the mean		•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-cal	culate	
tne utili	isation factor	T -	T .	1	Г					0	0.1	T No.		1	
Litilioot	Jan Fel		Apr	May		Jun	Jul	Al	ug	Sep	Oct	Nov	Dec]	
(94)m=	ion factor for 0.98 0.98	0.95	0.89	0.75	Γ,	0.53	0.36	0.4	<u> </u>	0.65	0.9	0.97	0.99	1	(94)
	gains, hmGr			ļ	`	3.55	0.50	0	<u>' </u>	0.00	0.5	0.57	0.55]	(0.)
_	583.92 611.6	 	604.99	519.07	35	58.02	233.59	245	.51	383.77	507.55	544.38	563.84	1	(95)
` ′ _	y average ex		l	L	<u> </u>		L	L = .5				1	I	J	V -7
(96)m=	4.3 4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	1	(96)
	ss rate for m			erature.			<u> </u>	x [(93	 3)m-	 - (96)m	1	1	I	1	
	1000.37 966.2		721.8	549.74	_	60.87	233.79	245.	_ т	393.92	611.4	819.94	994]	(97)
		-	-						!			-		1	

	309.84	238.26	185.24	84.1	22.82	0	0	0	0	77.26	198.4	320.04		
	-							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1435.96	(98
Space	heatin	g require	ement in	kWh/m²	² /year							Ī	18.88	(99
Bc. Sp	ace co	oling req	uiremen	nt								L		
		<u> </u>			See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat l	oss rate	Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
00)m=	0	0	0	0	0	598.91	471.48	482.78	0	0	0	0		(10
г		tor for lo		-							T			
01)m=	0	0	0	0	0 (4.0.4)	0.93	0.97	0.96	0	0	0	0		(10
г				`	(101)m		457.44	400.00						(1)
02)m=	0	0	0	for appli	0	557.08	457.41	462.23	0	0	0	0		(10
03)m=	(Solal (0	0	0 appii	0	713.8	680.73	e Table 645.01	0	0	0	0		(10
L												 102)m]x	(41)m	(**
		zero if (woming,	oomma	ouo (nii	11) — 0.0	211/10	,0,,,,, (102)III] X	(11)	
04)m=	0	0	0	0	0	112.84	166.15	135.99	0	0	0	0		
										= Sum(•	= [414.98	(10
	fraction		-l- 1 - 1 Ol-	`					f C =	cooled	area ÷ (4	4) = <u> </u>	0.59	(10
termit 06)m=	tency to	actor (Ta	o o o	0	0	0.25	0.25	0.25	0	0	0	0		
00)111=	U	U	U	0	U	0.23	0.23	0.23		l = Sum(l .	-	0	(1)
oace (coolina	reauirer	nent for	month =	: (104)m	× (105)	× (106)r	m	TOtal	ı – Sum	16 <u>06</u> +)	= [0	
07)m=	0	0	0	0	0	16.5	24.3	19.89	0	0	0	0		
L									Total	= Sum(107)	=	60.7	(1
oace (cooling	requirer	nont in l											
			neni in r	‹VVh/m²/›	/ear				(107)	\div (4) =		Ī	0.8	(1)
	erav rec	•				vstems i	ncludina	micro-C	` ') ÷ (4) =			0.8	(1
a. Ene		luiremer				ystems i	ncluding	micro-C	` ') ÷ (4) =			0.8	(1
a. Ene	heatir	uiremer ng:	its – Indi	ividual h					` ') ÷ (4) =			0.8	
n. Ene Space raction	heatir on of sp	uiremer ng:	nts – Indi	ividual h econdar	eating sy				CHP)) ÷ (4) =				(2
n. Ene Space Fraction	heating the heating of the heating the hea	uiremer ng: pace hea pace hea	nts – Indi nt from so	ividual h econdar nain syst	eating sy y/supple em(s)		system		CHP) - (201) =				0	(2
Practic	heatire heating heatin	uiremen ng: pace hea pace hea tal heatin	nts - Indi	ividual h econdar nain syst	eating sy y/supple em(s) stem 1		system	(202) = 1 -	CHP) - (201) =				0 1 1	(2)
Space Fraction Fraction Fraction Fraction Fraction	e heating on of spoon of spoon of too negroon of too negroes.	uiremen ng: pace hea pace hea tal heatin main spa	ats - Indi at from so at from m ag from ace heat	ividual h econdar nain syst main syst ing syste	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 -	CHP) - (201) =				0 1 1 89.5	(2)
a. Ene Space Fraction Fraction Fraction Efficie	e heatire on of spon of spon of to ncy of rency of spon of spo	uiremen ng: pace hea pace hea tal heatii main spa seconda	its - Indi	econdar nain systemain systemain systementar	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	CHP) - (201) =				0 1 1 89.5	(2)
a. Ene Space Fraction Fraction Fraction Efficie	e heatire on of spoon of too new of received and the new of second	uiremen ng: pace hea pace hea tal heatii main spa seconda em Energ	its - Indi	econdar nain systemain systemain systementar ency Ra	eating syysupple em(s) stem 1 em 1 y heating	mentary g system	system	(202) = 1 - (204) = (2 ¹)	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.5 0	(2) (2) (2) (2) (2) (2)
a. Ene Space Fraction Fraction Efficie Efficie Coolin	e heatire on of spon of too new of rendering of spon og Syste	uiremenng: Pace head tal heating main space seconda tem Energen	its – Indi it from so it from m ing from ace heat ry/supplo gy Efficie Mar	econdar nain systemain systemain systementar ency Ra Apr	eating sy y/supple em(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 -	CHP) - (201) =		Nov	Dec	0 1 1 89.5	(2) (2) (2) (2) (2) (2)
Efficie Coolin	e heatire on of spon of to new of renew of spon of spo	uiremen ng: pace hea pace hea tal heatii main spa seconda em Ener Feb g require	ats – Indicate from many f	econdar nain systemain systementar ency Ra Apr	eating sy y/supple em(s) stem 1 em 1 y heating tio May d above	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (2) Aug	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.5 0	(2) (2) (2) (2) (2) (2)
Efficie Coolin	e heating on of spon of to not of to not of spon of sp	uirements pace head pace h	ats – Indicate from some second secon	econdar nain systemain systementar ency Ra Apr calculate 84.1	eating sylvalupple em(s) stem 1 em 1 y heating tio May d above; 22.82	mentary g system Jun	system	(202) = 1 - (204) = (2 ¹)	CHP) - (201) = 02) × [1 -	(203)] =	Nov 198.4	Dec 320.04	0 1 1 89.5 0	(2) (2) (2) (2) (2) (2)
Efficie Coolin	e heatire on of spon of to noy of a noy of spon of spo	uiremen ng: vace hea vace hea tal heatin main spa seconda em Ener Feb g require 238.26	ats – Indicate from some set from many from the set of	econdar nain systemain systematar ency Ra Apr ealculate 84.1 00 ÷ (20	eating sy/supple em(s) stem 1 em 1 y heating tio May d above; 22.82	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	Sep	(203)] = Oct	198.4	320.04	0 1 1 89.5 0	(2) (2) (2) (2) (2) (2)
Efficie Coolin	e heating on of spon of to not of to not of spon of sp	uirements pace head pace h	ats – Indicate from some second secon	econdar nain systemain systementar ency Ra Apr calculate 84.1	eating sylvalupple em(s) stem 1 em 1 y heating tio May d above; 22.82	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	(203)] = Oct 77.26	198.4	320.04	0 1 1 89.5 0 4.73 kWh/ye	(2) (2) (2) (2) (2) (2) (2) (2)
Energy En	e heatire on of spon of to not of to not of spon of to not of spon of to not of spon o	uiremen ng: pace hea pace hea tal heatin main spa seconda em Energ Feb g require 238.26)m x (20 266.21	ats – Indicate from some terms of the second	econdar nain systemain systematar ency Ra Apr ealculate 84.1 00 ÷ (20 93.97	y/supple em(s) stem 1 em 1 y heating tio May d above 22.82 06) 25.5	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	(203)] = Oct	198.4	320.04	0 1 1 89.5 0	(2) (2) (2) (2) (2) (2) (2) (2)
Energy English	e heating on of spon of to not of to not of to not of to not of spon of to not of spon	wirements pace head	ats – Indicate from some secondary. at from some secondary. at from some secondary. at from some secondary. at from some secondary. at from some secondary. at from some secondary.	econdar nain systemain systementar ency Ra Apr ealculate 84.1 00 ÷ (20 93.97	y/supple em(s) stem 1 em 1 y heating tio May d above 22.82 06) 25.5	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	(203)] = Oct 77.26	198.4	320.04	0 1 1 89.5 0 4.73 kWh/ye	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
Space Fractic Fractic Fractic Efficie Coolin (211)m	e heating on of spon of to not of to not of to not of to not of spon of to not of spon	uiremen ng: pace hea pace hea tal heatin main spa seconda em Energ Feb g require 238.26)m x (20 266.21	ats – Indicate from some secondar. at from some secondar. at from some secondar. at from some secondar. at from some secondar.	econdar nain systemain systementar ency Ra Apr ealculate 84.1 00 ÷ (20 93.97	y/supple em(s) stem 1 em 1 y heating tio May d above 22.82 06) 25.5	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	(203)] = Oct 77.26	198.4	320.04	0 1 1 89.5 0 4.73 kWh/ye	(2) (2) (2) (2) (2) (2) (2) (2)

Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) (211) × (213) × (215) × (219)	4 179.	59 194	120	
Secondary Seco		39 194	89.5	(216
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219)m = (64)m x 100 ÷ (217)m (219)m = 222.41 194.28	89.	5 89		(217
(219)m = (64)m x 100 ÷ (217)m (219)m = (22.41 194.28 202.13 179.28 173.58 152.88 146.47 163.28 165.08 187. Total = Sum(219a), Space cooling fuel, kWh/month. (221)m = (107)m ÷ (209) (221)m = 0 0 0 0 0 3.49 5.14 4.21 0 0 Total = Sum(221), Annual totals Space heating fuel used, main system 1 Water heating fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel	1			`
Total = Sum(219a), Space cooling fuel, kWh/month. (221)m = (107)m ÷ (209)				
Space cooling fuel, kWh/month. (221)m = (107)m÷ (209) (221)m = 0 0 0 0 0 0 3.49 5.14 4.21 0 0 Total = Sum(221) _{k-a} Annual totals Space heating fuel used Space cooling fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tal Space heating - main system 1 (211) x Space heating - main system 2 (213) x Space heating - secondary (215) x Water heating cost (other fuel) (219) Space cooling Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost		66 217		— .
(221)m = (107)m÷ (209)	=		2205.19	(219
Annual totals Space heating fuel used, main system 1 Water heating fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tal Space heating - main system 1 (211) × Space heating - main system 2 (213) × Space heating - secondary (215) × Water heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (331) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =				
Annual totals Space heating fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall kWh/year (Tall space heating - main system 1 (211) x Space heating - main system 2 (213) x Space heating - secondary (215) x Water heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	0	C	D	
Space heating fuel used Space cooling fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tal Space heating - main system 1 (211) × Space heating - main system 2 (213) × Space heating - secondary (215) × Water heating cost (other fuel) (219) Space cooling Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Fotal energy cost			12.85	(22
Water heating fuel used Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tal kWh/year (Tal space heating - main system 1 (211) x (213) x (213) x (215) x (215) x (215) x (215) x (219) (219) Space heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	kWh/y	ear	kWh/ye	ar
Space cooling fuel used Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall Space heating - main system 1 (211) x [213] x [213] x [213] x [215] x			1604.43	
Electricity for pumps, fans and electric keep-hot mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall Space heating - main system 1 (211) x Space heating - main system 2 (213) x Space heating - secondary (215) x Water heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =			2205.19	
mechanical ventilation - balanced, extract or positive input from outside central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall Space heating - main system 1 (211) x [213] x [213] x [215] x [215] x [215] x [215] x [215] x [215] x [215] x [215] x [215] x [216] x [216] x [217] x [218] x [21			12.85	
central heating pump: Total electricity for the above, kWh/year sum of (230a)(230 Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall Space heating - main system 1 (211) x (211) x (213) x (215) x (215) x (215) x (219) (221) (
Total electricity for the above, kWh/year Electricity for lighting 10a. Fuel costs - individual heating systems: Fuel kWh/year (Tall Space heating - main system 1 (211) x		162	2.85	(23
Fuel kWh/year (Tal Space heating - main system 1 (211) x (213) x (215) x (215) x (219) (219) (221) (219) (221) (219) (221) (219) (221) (231) (231) (231) (231) (232) (232) (232) (245)(247) + (250)(254) =		3	0	(23
Fuel kWh/year (Tall Space heating - main system 1 (211) x Space heating - main system 2 (213) x Space heating - secondary (215) x Water heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =) =		192.85	(23
Fuel kWh/year (Tall Space heating - main system 1 (211) x Space heating - main system 2 (213) x Space heating - secondary (215) x Space heating cost (other fuel) (219) Space cooling (221) Pumps, fans and electric keep-hot (231) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =			332.22	(23:
Fuel kWh/year (Tal Space heating - main system 1 (211) x				
kWh/year (Tal Space heating - main system 1 (211) × Space heating - main system 2 (213) × Space heating - secondary (215) × Space heating cost (other fuel) (219) Space cooling (221) Space cooling (221) Space cooling (221) Space cooling (231) Space cooling (231) Space cooling (232) Space tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Space cooling (232) Space				
Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Space cooling Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (213) × (215) × (219) (221) (231) (231) (232) (232) (232) (232)	le 12)		Fuel Cos £/year	τ
Space heating - secondary Water heating cost (other fuel) Space cooling Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (215) × (219) (221) (231) (232) (232) (232) (232)	2.40	x 0.0	11 = 55.83	(240
Water heating cost (other fuel) Space cooling Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (219) (221) (231) (232) (232) (245)(247) + (250)(254) =	3.48	x 0.0	01 = 0	(24
Space cooling (221) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (221) (231) (232) (232) (245)(247) + (250)(254) =	0	x 0.0	01 = 0	(24
Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (231) (232) (232) (245)(247) + (250)(254) =			11 = 76.74	(24
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	0	x 0.0	1.69	(24
Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	0 3.19 3.48	x 0.0 x 0.0		(24
Energy for lighting (232) Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	0 3.19	_		
Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =	0 3.19 3.48 3.19 3.19	x 0.0 x 0.0		(25
Total energy cost (245)(247) + (250)(254) =	0 3.19 3.48 3.19 3.19	x 0.0 x 0.0	11 = 43.82	— ₍
Total energy cost (245)(247) + (250)(254) =	0 3.19 3.48 3.19 3.19 orice ac	× 0.0 × 0.0 cording	11 = 43.82	(25
11a SAP rating - individual heating systems	0 3.19 3.48 3.19 3.19 orice ac	× 0.0 × 0.0 cording	40.02	(25
Tra. On Taking Theiriducian heating systems	0 3.19 3.48 3.19 3.19 orice ac	× 0.0 × 0.0 cording	40.02	(25
Energy cost deflator (Table 12)	0 3.19 3.48 3.19 3.19 orice ac	× 0.0 × 0.0 cording	120	
Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0] =	0 3.19 3.48 3.19 3.19 orice ac	× 0.0 × 0.0 cording	120	

SAP rating (Section 12) (258)84.34 12a. CO2 emissions – Individual heating systems including micro-CHP **Energy Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year (211) x Space heating (main system 1) (261) 0.216 346.56 Space heating (secondary) (215) x (263)0.519 Water heating (219) x 0.216 476.32 (264)(261) + (262) + (263) + (264) =Space and water heating (265)822.88 (221) x Space cooling (266)0.519 6.67 Electricity for pumps, fans and electric keep-hot (231) x (267)0.519 100.09 (232) x Electricity for lighting (268)0.519 172.42 sum of (265)...(271) = Total CO2, kg/year 1102.06 (272)CO2 emissions per m² $(272) \div (4) =$ (273)14.49 El rating (section 14) (274)88 13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	1957.4 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2690.34 (264)
Space and water heating	(261) + (262) + (263) + (264) =		4647.74 (265)
Space cooling	(221) x	3.07	39.44 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	592.06 (267)
Electricity for lighting	(232) x	0 =	1019.91 (268)
'Total Primary Energy	sum	of (265)(271) =	6299.14 (272)
Primary energy kWh/m²/year	(272	?) ÷ (4) =	82.82 (273)

				User E	Details:						
Assessor Name: Software Name:	Chris Hoc Stroma FS	_	2		Strom Softwa					016363 on: 1.0.4.10	
			Р	roperty	Address	: Flat 3-1	1-Lean				
Address:	ongional										
Overall dwelling dime	ensions:			Δro	a(m²)		Av. Hei	iaht(m)		Volume(m³)	
Basement					· ,	(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	la)+(1b)+(1c)+	·(1d)+(1e)+(1r	n)	74.06	(4)]`		」 ` ′
Dwelling volume	, (, (,	(-) (-	, (′ <u> </u>	1.00)+(3c)+(3d	l)+(3e)+	.(3n) =	192.56	(5)
						(00)	, , () , (,, (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		192.56	
2. Ventilation rate:	main	se	econdar	У	other		total			m³ per hour	
Number of chimneys	heating 0		eating 0	□ + □	0	п = Г	0	x 4	40 =	0	(6a)
Number of open flues		╡╻┝		」]		x :	20 =		╣```
Number of intermittent fa	0		0	J L	0	┙┟	0		10 =	0	(6b)
						Ļ	0			0	[(7a)
Number of passive vents						Ĺ	0		10 =	0	(7b)
Number of flueless gas f	fires						0	X 4	40 =	0	(7c)
									Air ch	anges per ho	ur
Infiltration due to chimne	evs flues and	ans – (6	a)+(6b)+(7	'a)+(7b)+((7c) =	Г	0		÷ (5) =] (8)
If a pressurisation test has						continue fr	0 rom (9) to (. (3) =	0	_(0)
Number of storeys in t			.,	, ,,			, , ,	,		0	(9)
Additional infiltration								[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: (•	ruction			0	(11)
if both types of wall are p deducting areas of open			ponding to	the grea	ter wall are	a (after					
If suspended wooden	• ,		ed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else	enter 0								0	(13)
Percentage of window	s and doors d	raught st	ripped							0	(14)
Window infiltration					0.25 - [0.2	` '	-			0	(15)
Infiltration rate							12) + (13) +			0	(16)
Air permeability value	• •			•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabi							is heina us	sed		0.15	(18)
Number of sides shelter		01110011100		.0 0. 4 40,	g. 00 a po		.o .o			2	(19)
Shelter factor					(20) = 1 -	[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	iting shelter fa	ctor			(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified	for monthly wi	nd speed	l	•			•			•	
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Tab	le 7						1		1	
(22)m= 5.1 5	4.9 4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	22)m ÷ 4										
(22a)m= 1.27 1.25	1.23 1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective air o	-	rate for t	he appli	cable ca	se	!	!	!	!	1		
If mechanical ventila		l' N. (0	(20)	. - (\(\frac{1}{2}\)	. (00)	\ (00.)			0.5	(23
If exhaust air heat pump u) = (23a)			0.5	(23
If balanced with heat reco	-	-	_								76.5	(23
a) If balanced mecha				1	- 	- ^ `	ŕ	 		` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` 	÷ 100] I	(2)
24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(2
b) If balanced mecha			i	1		- ^ ` 	í `	– `	- 	Т .	İ	(2)
24b)m= 0 0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole house ext if (22b)m < 0.5 ×			•	•				5 × (23h	n)			
$\frac{1}{(225)} = 0 \qquad 0$	0	0	0	0	0	0) - (22.	0	0	0	0		(2
d) If natural ventilation	n or wh	ole hous	L se positiv	ve input	L ventilati	on from I	oft			<u> </u>	l	
if $(22b)m = 1$, the			•	•				0.5]				
24d)m= 0 0	0	0	0	0	0	0	0	0	0	0		(2
Effective air change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				_	
25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(2
3. Heat losses and he	at loss p	paramete	er:									
LEMENT Gros	_	Openin		Net Ar		U-val		AXU		k-value		AXk
area Doors	(m²)	m	1 ²	A ,r	n²	W/m2	'K	(W/	K)	kJ/m²-l	〈	kJ/K
ioors								,		10/111	•	
				2.6	x	1.2	=	3.12		NO/III	`	(2
Vindows Type 1				3.26	x x1	1.2 /[1/(1.2)+	0.04] =	3.12		1.0,111		(2
Vindows Type 1 Vindows Type 2				3.26	x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] =	3.12 3.73 4.52		KO/III		(2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3				3.26	x x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.12		κο/	•	(2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4				3.26 3.95 5.51 0.65	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74		NG/III	` 	(2 (2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 67.7	8	20.5	8	3.26 3.95 5.51	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31		NO,		(2 (2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 24.4		20.56	8	3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74				(2 (2 (2 (2 (2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 67.7	7		8	3.26 3.95 5.51 0.65 47.2	x1 x1 x1 x1 x1 x1 x1 xx1 xx1 xx1 xx1 xx	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = =	3.12 3.73 4.52 6.31 0.74 7.08				(2 (2 (2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 5.93	7	2.6	8	3.26 3.95 5.51 0.65 47.2 21.87	x1 x1 x1 x1 x1 x1 x x1 x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28				(2 (2 (2 (2 (2 (2
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 5.93	7	2.6	8	3.26 3.95 5.51 0.65 47.2 21.87 5.93	x1 x1 x1 x1 x1 x1 x x x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89				(2 (2 (2 (2 (2 (2 (2 (2 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type2 Valls Type3 Soof 19.7	7	2.6	8	3.26 3.95 5.51 0.65 47.2 21.87 5.93	x1 x1 x1 x1 x1 x1 x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89				(2 (2 (2 (2 (2 (2 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 Soof Total area of elements, Party wall	7	2.6	8	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				(2 (2 (2 (2 (2 (2 (3 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 Soof 19.7	7	2.6	8	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				(2 (2 (2 (2 (2 (2 (3 (3 (3 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 Soof Total area of elements, Party wall Party floor Party ceiling for windows and roof windows	7 3 2 , m ²	2.6 0 0	indow U-va	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calcul	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				(2 (2 (2 (2 (2 (2 (3 (3 (3 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 67.7 Valls Type2 24.4 Valls Type3 5.93 Roof 19.7 Total area of elements, Party wall Party floor Party ceiling for windows and roof windows include the areas on both	7 3 2 , m ² ows, use e	2.6 0 0 effective with ternal wall	indow U-va	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calcul	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				(2 (2 (2 (2 (2 (3 (3 (3 (3 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 Soof 19.7 Total area of elements, Party wall Party floor	7 2 2 ows, use esides of interest S (A x	2.6 0 0 effective with ternal wall	indow U-va	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calcul	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the state of the	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96	as given in	n paragraph		(2 (2 (2 (2 (2 (2 (3 (3 (3 (3 (3 (3
Vindows Type 1 Vindows Type 2 Vindows Type 3 Vindows Type 4 Valls Type1 Valls Type2 Valls Type3 Soof Total area of elements, Party wall Party floor Party ceiling for windows and roof windows include the areas on both fabric heat loss, W/K =	7 2 2 2 2 2 2 3 3 5 3 5 6 7 6 7 7 8 7 8 7 8 8 8 8 9 9 9 9 9 9 9 9 9 9	2.6 0 0 stiffective with atternal walk	indow U-va	3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculatitions	x x1 x1 x1 x1 x1 xx xx xx xx xx xx xx xx	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the state of the	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96	as given ir	n paragraph	3.2	(2 (2 (2 (2 (2 (2 (3 (3 (3 (3 (3 (3

Total fabric he	4	are not kii	OWII (30) =	= 0.15 x (3	1)			(00)	(0.0)		Г		–
		alouloto d	l manthl					(33) +	` '	25\m v (5\		63.71	(37)
Ventilation he					luna	ll	Λ	` ,	`	25)m x (5)	Dag		
(38)m= 17.8	Feb 17.59	Mar 17.39	Apr 16.38	May 16.18	Jun 15.16	Jul 15.16	Aug 14.96	Sep 15.57	Oct 16.18	16.58	Dec 16.99		(38)
` ′			10.36	10.16	15.16	15.16	14.96			<u> </u>	16.99		(30)
Heat transfer	1					i			= (37) + (· · · · · ·			
(39)m= 81.5	81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		7,00
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	80.03	(39)
(40)m= 1.1	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.08	1.09		
								,	Average =	Sum(40) ₁ .	12 /12=	1.08	(40)
Number of day	ys in mor	nth (Tab	le 1a)										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	iting ener	av reani	rement:								kWh/ye	ear:	
i. Water floa	anig onoi	gy roqui	romone.								icvvii, y c	, ai.	
Assumed occ											34		(42)
if TFA > 13.		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)	(2)] + 0.0	0013 x (ΓFA -13.	.9)			
if TFA £ 13. Annual averag	•	tor usac	no in litro	s per da	w Vd av	orago –	(25 v NI)	+ 36			70		(42)
Reduce the annu									se target o		.79		(43)
not more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage				,			•	Cop					
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
30.77								-	Total = Su	m(44) _{1 12} =	.	1077.45	(44)
` ′	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	1077.45	(44)
Energy content of								kWh/mon	th (see Ta	ables 1b, 1	c, 1d)	1077.45	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r 95.42	m x nm x D 88.42	0Tm / 3600 101.47	102.68	th (see Ta	130.62	c, 1d)		 `
Energy content of (45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	ables 1b, 1	c, 1d)	1077.45	(44)
Energy content of 45)m= 146.47	128.1 water heatin	132.19	115.25 of use (no	110.58 hot water	95.42 storage),	88.42 enter 0 in	101.47 boxes (46,	102.68 106 (61)	119.66 Total = Su	130.62 m(45) ₁₁₂ =	c, 1d)		(45)
Energy content of 45)m= 146.47 If instantaneous v (46)m= 21.97	128.1 water heatin	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	130.62	c, 1d)		(45)
Energy content of (45)m= 146.47 If instantaneous with (46)m= 21.97 Water storage	128.1 water heatin 19.22 Ploss:	132.19 ng at point 19.83	115.25 of use (no	110.58 hot water 16.59	95.42 storage),	88.42 enter 0 in	101.47 boxes (46) 15.22	102.68 1 to (61) 15.4	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d)		(45) (46)
Energy content of (45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage volumes	128.1 water heatin 19.22 Ploss: ne (litres)	132.19 ng at point 19.83 includin	115.25 of use (no 17.29	110.58 hot water 16.59 Dlar or W	95.42 storage), 14.31	88.42 enter 0 in 13.26 storage	101.47 boxes (46) 15.22 within sa	102.68 1 to (61) 15.4	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
Energy content of (45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h	128.1 water heatin 19.22 Ploss: ne (litres) heating a	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 ag any so nk in dw	110.58 hot water 16.59 Dlar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 1 mme vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
Energy content of (45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum of community is otherwise if n	128.1 water heating 19.22 e loss: ne (litres) heating a o stored	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 ag any so nk in dw	110.58 hot water 16.59 Dlar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 1 mme vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
Energy content of (45)m= 146.47 If instantaneous volumed (46)m= 21.97 Water storage volumed frommunity is otherwise if no water storage water storage water storage water storage water storage water storage water storage	128.1 water heatin 19.22 e loss: ne (litres) heating a o stored e loss:	132.19 ng at point 19.83 includin nd no ta hot wate	of use (no 17.29 ag any so nk in dw er (this in	110.58 hot water 16.59 Dlar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 1 mme vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28		(45) (46) (47)
Energy content of (45)m= 146.47 If instantaneous was (46)m= 21.97 Water storage Storage volum of community in the community	128.1 water heatin 19.22 Ploss: ne (litres) heating a o stored Ploss: turer's de	132.19 ng at point 19.83 includin nd no ta hot wate	of use (not) 17.29 ag any so nk in dw er (this in)	110.58 hot water 16.59 Dlar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 1 mme vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28		(45) (46) (47)
Energy content of (45)m= 146.47 If instantaneous was a storage (46)m= 21.97 Water storage volum f community if community if Community	128.1 water heatin 19.22 e loss: ne (litres) heating a o stored e loss: turer's de	132.19 ng at point 19.83 includin nd no ta hot wate eclared le	of use (not) 17.29 ag any so nk in dw er (this in) coss facto 2b	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49)
Energy content of (45)m= 146.47 If instantaneous was (46)m= 21.97 Water storage Storage volum of community in the community	128.1 water heatin 19.22 Ploss: ne (litres) heating a o stored Ploss: turer's de factor fro	132.19 ng at point 19.83 includin nd no ta hot wate eclared le m Table storage	of use (not) 17.29 ag any so nk in dwer (this in) coss factor 2b , kWh/ye	110.58 hot water 16.59 plar or W relling, e	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28		(45) (46) (47) (48) (49)
Energy content of (45)m= 146.47 If instantaneous victorage Storage volum of community in the community in t	128.1 water heatin 19.22 e loss: ne (litres) heating a o stored e loss: turer's de factor fro om water turer's de	132.19 Ing at point 19.83 includin Ind no ta hot wate eclared le m Table storage eclared of	of use (not) 17.29 ag any so nk in dw er (this in) coss facto 2b , kWh/ye	110.58 hot water 16.59 plar or W relling, e reludes i or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49) (50)
Energy content of (45)m= 146.47 If instantaneous was (46)m= 21.97 Water storage Storage volum of community in the community	19.22 Ploss: ne (litres) heating a o stored e loss: turer's defactor from water turer's defactors heating series defactors def	132.19 ng at point 19.83 includin nd no ta hot wate eclared le m Table storage eclared of	of use (not) 17.29 In any so the ser (this in) 17.29 In any so the ser (this in) 17.29 In any so the ser (this in) 17.29 In any so the ser (this in) 17.29 In any so the ser (this in) 17.29	110.58 hot water 16.59 plar or W relling, e reludes i or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0 0 0		(45) (46) (47) (48) (49) (50)
Energy content of 45)m= 146.47 If instantaneous w 46)m= 21.97 Water storage Storage volum f community h Otherwise if n Water storage a) If manufac Temperature for Energy lost from b) If manufact Hot water storage f community h Volume factor	128.1 water heatin 19.22 loss: he (litres) heating a o stored loss: turer's de factor fro om water turer's de rage loss heating s	132.19 Ing at point 19.83 includin Ind no ta hot wate eclared le storage eclared of factor fr ee section ble 2a	of use (not) 17.29 In any so the ser (this in) 17.	110.58 hot water 16.59 plar or W relling, e reludes i or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0 0 0		(45) (46)
Energy content of (45)m= 146.47 If instantaneous with the storage of the storag	128.1 water heatin 19.22 loss: he (litres) heating a o stored loss: turer's de factor fro om water turer's de rage loss heating s	132.19 Ing at point 19.83 includin Ind no ta hot wate eclared le storage eclared of factor fr ee section ble 2a	of use (not) 17.29 In any so the ser (this in) 17.	110.58 hot water 16.59 plar or W relling, e reludes i or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 1 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0 0 0 0		(45) (46) (47) (48) (49) (50) (51)
Energy content of (45)m= 146.47 If instantaneous with the storage of the storag	128.1 water heating 19.22 c loss: ne (litres) heating a o stored c loss: turer's de factor fro turer's de rage loss heating s from Tal factor fro	132.19 Ing at point 19.83 Including the notation of the water of the storage of the storage of the storage of the section o	of use (not) 17.29 ag any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 clar or Water relling, eacludes it is known in the control of the con	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day): known:	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 102.68 10 to (61) 15.4 ame vessers) enter	119.66 Total = Su 17.95 sel er '0' in (130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0 0 0 0 0		(45) (46) (47) (48) (49) (50) (51) (52)

Water storag	e loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary circu	`	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.33	43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat re	quired for	water he	eating ca	alculated	l for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW inpu	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)		_			
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	vater hea	iter											
(64)m= 196.8	171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	-		-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	
(65)m= 61.28	53.55	55.62	49.17	47.52	41.69	00.7	1		ĺ		i		()
	1	00.02	49.17	47.52	41.09	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include (57)m in cal		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		l eating	(65)
include (57	•	culation (of (65)m	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		neating	(65)
,	gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>		eating	(65)
5. Internal of Metabolic ga	ns (Table	culation of Table 5	of (65)m and 5a	only if c	ı :ylinder i:	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. Internal of Metabolic ga	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
5. Internal of Metabolic ga Jan (66)m= 140.43	ns (Table Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 140.43	only if c): May 140.43	Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	neating	
5. Internal of Metabolic ga Metabolic ga Jan (66)m= 140.43	ns (Table Feb 140.43 s (calcula 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	neating	(66)
5. Internal of Metabolic gardinal Jan (66)m= 140.43 Lighting gain (67)m= 46.04	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 6 Table 5 6 Table 5 6 Table 5 7 Table	of (65)m 6 and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
5. Internal of Metabolic games Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
5. Internal of Metabolic game Metabolic game Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances game (68)m= 308.33	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 311.53	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3	May 140.43 L, equat 18.82 dix L, eq 264.64	Jun 140.43 ion L9 o 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 Iso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	neating	(66) (67)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38	culation of Table 5 2 5), Wat Mar 140.43 4ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m s and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38	May 140.43 L, equat 18.82 dix L, eq 264.64 L, equat	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 s (calcula 51.38 ans gains 3	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if constructions only if constructions	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio	culation of the Europe Solution of the Europe	of (65)m 5 and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 lso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	neating	(66) (67) (68)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62	culation of the culation of th	of (65)m of and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 5a) 3 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 tion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36 51.38	Dec 140.43 47.32 294.73 51.38	neating	(66) (67) (68) (69)
Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin	repairs (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 s (vaporatio 93.62 g gains (T. 79.68	culation of the culation of th	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)
5. Internal (Metabolic ga Jan (66)m= 140.43 Lighting gain (67)m= 46.04 Appliances g (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and f (70)m= 3 Losses e.g. 6 (71)m= -93.62 Water heatin (72)m= 82.37	repains (see ns (Table Feb 140.43 s (calcula 40.89 ains (calcula 51.38 ans gains 3 evaporatio -93.62 g gains (Table 79.68 all gains =	culation of the culation of th	of (65)m of (65)m of and 5a tts Apr 140.43 opendix 25.18 Appendix 286.3 ppendix 51.38 opendix 51.38 opendix 51.38 opendix 51.38	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15 51.38 3 ble 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 , also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 3 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 3 -93.62	Nov 140.43 44.39 274.36 51.38 3	Dec 140.43 47.32 294.73 51.38 3	neating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southw	est _{0.9x}	0.77	x	0.6	S5	X	10	04.39			0.24	x	0.7	=	7.9	(79)
Southw	est _{0.9x}	0.77	x	5.5	51	X	9	2.85			0.24	x [0.7	=	59.56	(79)
Southw	est _{0.9x}	0.77	X	0.6	35	X	9	2.85]		0.24	x	0.7	=	7.03	(79)
Southw	est _{0.9x}	0.77	×	5.5	51	X	6	9.27]		0.24	x	0.7	_	44.43	(79)
Southw	est _{0.9x}	0.77	x	0.6	S5	x	6	9.27]		0.24	x [0.7		5.24	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	x [0.7	=	28.27	(79)
Southw	est _{0.9x}	0.77	x	0.6	35	x	4	4.07			0.24	x	0.7	=	3.34	(79)
Southw	est _{0.9x}	0.77	×	5.5	51	x	3	1.49			0.24	×	0.7		20.2	(79)
Southw	est _{0.9x}	0.77	×	0.6	35	x	3	1.49			0.24	×	0.7		2.38	(79)
Solar	gains in	watts, c	alculated	for eac	h month				(83)m	n = Si	um(74)m .	(82)m				
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total g	ains – i	nternal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts							_	
(84)m=	583.27	616.8	643.65	671.25	687.23	66	67.49	637.02	607	.57	580.4	557.88	552.01	561.6		(84)
7. Me	an inter	nal temp	perature	(heating	season)										
Temp	erature	during h	neating p	eriods ir	n the livi	ng a	area 1	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for l	living are	ea, h1,m	(Se	ee Ta	ble 9a)								
	Jan	Feb	Mar	Apr	May	Ι,	Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98	0.95	0.87	().71	0.53	0.5	58	0.82	0.96	0.99	0.99		(86)
Mean	interna	l temper	ature in	living an	ea T1 (fo	טווס	w ste	ns 3 to 7	7 in T	able	9c)			•		
(87)m=	20	20.11	20.3	20.58	20.82	_	0.96	20.99	20.	_	20.91	20.62	20.27	19.98		(87)
		ا بماندیات				سا	مالنم		l bla (-2 (00)			<u> </u>		
(88)m=	20	20	neating p	20.02	20.02	_	0.03	20.03	20.	$\overline{}$	20.03	20.02	20.01	20.01		(88)
									L	00	20.00	20.02	20.01	20.01		(00)
			ains for			_	<u> </u>		É				1		7	(00)
(89)m=	0.99	0.99	0.97	0.93	0.83		0.62	0.42	0.4	17	0.74	0.94	0.98	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_	
(90)m=	18.69	18.84	19.13	19.52	19.84		20	20.03	20.	03	19.95	19.59	19.08	18.66		(90)
											f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m=	19.03	19.17	19.43	19.8	20.09	2	0.25	20.28	20.	28	20.2	19.86	19.39	19.01		(92)
Apply	adjustr	nent to t	he mean	interna	temper	atu	re fro	m Table	4e,	whe	re appro	priate			_	
(93)m=	18.88	19.02	19.28	19.65	19.94	2	20.1	20.13	20.	13	20.05	19.71	19.24	18.86		(93)
8. Sp	ace hea	ting req	uirement													
				•		ned	at ste	ep 11 of	Tabl	le 9b	o, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the ut		ı	or gains			_						<u> </u>	1			
Litilio	Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(94)m=	0.99	0.98	ains, hm	0.93	0.82		0.63	0.43	0.4	18	0.74	0.93	0.98	0.99		(94)
			, W = (9 ²		<u> </u>		7.00	0.40	0.5	-	0.74	0.55	0.50	0.55		(0.)
(95)m=	575.87	605.41	622.36	620.94	565.31	41	17.69	276.51	290	.25	431.68	518.57	539.72	555.63		(95)
		l .	ernal tem		l	<u> </u>		L	I = 2 3	-			1	1		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
(96)m=	4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
	loss rate	e for me	an intern		 erature.			<u> </u>	x [(9:	 3)m-	– (96)m]	1		_	
(97)m=		r	1036.77		658.52	_	33.92	278.39	293		471.79	727.51	975.08	1182.6	2	(97)
*													1		_	

	364.74	308.32	172.6	69.35	0	0	0	0	155.45	313.46	466.49		
	•					!	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2306.05	(98
Space heating	ng require	ement in	kWh/m	²/year							Ī	31.14	(9
Sc. Space co	ooling rec	uiremen	it								_		
Calcu <u>lated fo</u>	or June, c	July and	August.	See Tab	le 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
leat loss rat							i e				$\overline{}$		
0)m= 0	0	0	0	0	741.37	583.63	597.87	0	0	0	0		(1
tilisation fac	1	1		1			I	_	_	_			/4
1)m= 0	0	0	0	0	0.82	0.9	0.87	0	0	0	0		(1
seful loss, l	 	r í		` 		l							//
2)m= 0	0	0	0	0	608.97	523.03	519.34	0	0	0	0		(1
ains (solar 3)m= 0	gains ca	o liculated	for appi	cable we	706.39	673.64	637.8	10)	0	0	0		(1
		ll		ll		l .						(11)m	('
<i>pace coolin</i> et (104)m to	•				weiling,	COMITIU	ous (KVV	11) = 0.0	24 X [(10	<i>13)111</i> – (102)III] X	(41)111	
4)m= 0	0	0	0	0	70.15	112.05	88.13	0	0	0	0		
	1							Total	l = Sum(104)	=	270.33	\ (1
oled fractio	n							f C =	cooled	area ÷ (4	1) =	0.6	(1
ermittency t	factor (Ta	able 10b)										_
6)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
								Tota	l = Sum(104)	= [0	(1
ace cooling				` 		_ ` 	1						
7)m= 0	0	0	0	0	10.54	16.83	13.24	0 T : 1 = 1	0	0	0		٦,
									l = Sum(107)	= [40.61	(1
ace cooling	') ÷ (4) =		L	0.55	(1
. Energy re		nts – Indi	vidual h	eating sy	/stems i	ncluding	micro-C	HP)					
pace heati	•			/							г		7(2
raction of s	•				mentary	system		(004)			Ļ	0	╡`
	•		_	, ,			(202) = 1 -	` '			Ĺ	<u> </u>	(2
	otal heatii	ng from r	main sy	stem 1			(204) = (204)	02) x [1 –	(203)] =		L	1	(2
raction of to	main spa	ace heati	ing syst	em 1								89.5	(2
raction of to	•				g system	ո, %					L	89.5	╡`
raction of space of the fraction of the fracti	seconda	ry/supple	ementar	y heating	g system	າ, %							(2)
raction of to	seconda	ry/supple	ementar	y heating		1	Aug	Sen	Oct	Nov	Dec	0 4.73	(2
raction of to fficiency of fficiency of ooling Syst	seconda tem Ener	ry/supple gy Efficie Mar	ementar ency Ra Apr	y heating tio May	g system Jun	n, %	Aug	Sep	Oct	Nov	Dec	0	(2
raction of to fficiency of fficiency of ooling Syst	seconda tem Ener Feb ng require	ry/supple gy Efficie Mar	ementar ency Ra Apr	y heating tio May		1	Aug	Sep 0	Oct 155.45	Nov 313.46	Dec 466.49	0 4.73	(2
raction of to fficiency of fficiency of ooling Syst Jan pace heatin	seconda tem Ener Feb ng require 364.74	gy Efficie Mar ement (ca	ementar ency Ra Apr alculate 172.6	y heating tio May d above) 69.35	Jun	Jul		,	! !			0 4.73](2](2 ar
raction of to fficiency of fficiency of cooling Syst Jan pace heatin 455.65	seconda tem Ener Feb ng require 364.74 B)m x (20	my/supple gy Efficie Mar ement (co 308.32	ementar ency Ra Apr alculate 172.6 00 ÷ (20	y heating tio May d above) 69.35	Jun 0	Jul 0	0	0	155.45	313.46	466.49	0 4.73](2](2 ar
raction of to fficiency of fficiency of ooling Syst Jan pace heatin	seconda tem Ener Feb ng require 364.74	gy Efficie Mar ement (ca	ementar ency Ra Apr alculate 172.6	y heating tio May d above) 69.35	Jun	Jul	0	0	155.45 173.69	313.46 350.23	466.49 521.21	0 4.73 kWh/ye	(2 ar
raction of to fficiency of ooling Syst Jan pace heatir 455.65 1)m = {[(98)	seconda tem Ener Feb ng require 364.74 3)m x (20 407.53	mar ement (call 308.32 lb)] } x 1	Apr alculate 172.6 00 ÷ (20	y heating tio May d above) 69.35 06) 77.48	Jun 0	Jul 0	0	0	155.45	313.46 350.23	466.49 521.21	0 4.73	(2 ar
raction of to fficiency of fficiency of ooling Syst Jan pace heatir 455.65 11)m = {[(98) 509.11	seconda tem Energy Feb ng require 364.74 B)m x (20 407.53	mar gy Efficient Mar gement (c. 308.32 graph)] } x 1 graph additional statement with the statement of the st	Apr alculate 172.6 00 ÷ (20 192.85	y heating tio May d above) 69.35 06) 77.48	Jun 0	Jul 0	0	0	155.45 173.69	313.46 350.23	466.49 521.21	0 4.73 kWh/ye	(2
raction of to fficiency of fficiency of ooling Syst Jan pace heatin 455.65	seconda tem Energy Feb ng require 364.74 B)m x (20 407.53	mar gy Efficient Mar gement (c. 308.32 graph)] } x 1 graph additional statement with the statement of the st	Apr alculate 172.6 00 ÷ (20 192.85	y heating tio May d above) 69.35 06) 77.48	Jun 0	Jul 0	0	0	155.45 173.69	313.46 350.23	466.49 521.21	0 4.73 kWh/ye	(2 ar

Output from water heate	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18	1	
Efficiency of water heat		100101	100100							1.02	89.5	(2
217)m= 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(21
uel for water heating, k					•	•	•		•	•	•	
$(219)m = (64)m \times 100$ $(219)m = (219.89) \times 192.08$	÷ (217) 199.84	m 177.25	171.61	151.14	144.81	161.43	163.21	185.85	198.39	214.72	1	
, <u> </u>					<u> </u>	Tota	l = Sum(2				2180.21	(2
Space cooling fuel, kW		nth.										_
$221)m = (107)m \div (209)$ $221)m = 0 0$	0	0	0	2.23	3.56	2.8	0	0	0	0	1	
221)111= 0 0	0	U	0	2.23	3.30		l = Sum(2:		0		8.59	(22
Annual totals									Wh/year	•	kWh/yea	
Space heating fuel used	d, main	system	1						, oa.		2576.59	T
Water heating fuel used											2180.21	Ī
Space cooling fuel used											8.59	Ħ
Electricity for pumps, far	ns and	electric	keep-ho	t								_
mechanical ventilation	- balan	ced, ext	ract or p	ositive ii	nput fror	n outside	е			158.57	1	(23
central heating pump:										30	j	(23
Total electricity for the a	bove, k	(Wh/yea	r			sum	of (230a).	(230g) =			188.57	(23
		-										
Electricity for lighting											325.25	(23
Electricity for lighting 10a. Fuel costs - individ	dual he	ating sy	stems:								325.25	(23
Electricity for lighting 10a. Fuel costs - individ	dual he	ating sy	stems:	E. .				Euol D	rioo			(23
	dual he	ating sy	stems:	Fu kW	el /h/year			Fuel P (Table			325.25 Fuel Cost £/year	
10a. Fuel costs - individ			stems:	kW					12)	x 0.01 =	Fuel Cost	
10a. Fuel costs - individual formation of the state of th	/stem 1		stems:	kW (21	/h/year			(Table	12)	x 0.01 = x 0.01 =	Fuel Cost £/year	(24
10a. Fuel costs - individual formation of the second secon	vstem 1 vstem 2		stems:	kW (21° (21°	/h/year 1) x			(Table	12)		Fuel Cost £/year	
	vstem 1 vstem 2 ary		stems:	kW (21° (21°	/h/year 1) x 3) x 5) x			(Table	12)	x 0.01 =	Fuel Cost £/year 89.67](24](24
10a. Fuel costs - individual forms of the second water heating cost (otherwise)	vstem 1 vstem 2 ary		stems:	(21:	/h/year 1) x 3) x 5) x			(Table 3.4 0 13. 3.4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	12)	x 0.01 = x 0.01 =	Fuel Cost £/year 89.67 0 0 75.87	(2 ² (2 ²
10a. Fuel costs - individual forms of the second of the se	vstem 1 vstem 2 ary er fuel)		stems:	(21) (21) (21) (21)	/h/year 1) x 3) x 5) x 9)			(Table 3.4 0 13.	12) 88 19 19	x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 89.67	(2 ² (2 ²
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Water heating cost (other space cooling Pumps, fans and electric	vstem 1 vstem 2 ary er fuel) c keep-	hot		(21) (21) (21) (21) (22) (23)	/h/year 1) x 3) x 5) x 9) 1)	licable a	ınd apply	(Table 3.4 0 13. 13. 13.	12) 8 19 8 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 89.67 0 0 75.87 1.13 24.87	(2 ⁴
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other space cooling Pumps, fans and electrical off-peak tariff, list each	vstem 1 vstem 2 ary er fuel) c keep-	hot		(21) (21) (21) (21) (22) (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 13.	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 89.67 0 0 75.87 1.13 24.87	(2 ²) (2 ²) (2 ²) (2 ²) (2 ²)
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Vater heating cost (other Space cooling Pumps, fans and electric if off-peak tariff, list eace	vstem 1 vstem 2 ary er fuel) c keep- ch of (23	hot 30a) to (kW (21) (21) (21) (22) (23) eparately	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 89.67 0 75.87 1.13 24.87 Table 12a	(2-) (2-) (2-) (2-) (2-) (2-) (2-) (2-)
10a. Fuel costs - individual formation of the second secon	rstem 1 rstem 2 ary er fuel) c keep- ch of (23	hot 30a) to (230g) se	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 89.67 0 75.87 1.13 24.87 Table 12a 42.9	(2-) (2-) (2-) (2-) (2-) (2-) (2-) (2-)
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Water heating cost (other space cooling Pumps, fans and electric off-peak tariff, list each energy for lighting Additional standing characterists.	rstem 1 rstem 2 ary er fuel) c keep- ch of (23	hot 30a) to (230g) se nd (254)	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 89.67 0 75.87 1.13 24.87 Table 12a 42.9	(2 ⁴
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Water heating cost (other Space cooling Pumps, fans and electric if off-peak tariff, list each Energy for lighting Additional standing charms	vstem 1 vstem 2 ary er fuel) c keep- ch of (23 rges (Ta at lines	hot 30a) to (able 12) (253) ai	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 89.67 0 0 75.87 1.13 24.87 Table 12a 42.9 120	(24) (24) (24) (25) (25)
Space heating - main sy Space heating - main sy Space heating - main sy Space heating - second Water heating cost (other Space cooling Pumps, fans and electric if off-peak tariff, list each Energy for lighting Additional standing char Appendix Q items: reperfotal energy cost	vstem 1 vstem 2 ary er fuel) c keep- ch of (23 rges (Ta at lines	hot 30a) to (able 12) (253) ar	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 88 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 89.67 0 0 75.87 1.13 24.87 Table 12a 42.9 120	(2 (2 (2 (2 (2 (2 (2

12a. CO2 emissions – Individual heating systems including micro-CHP **Energy Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year (211) x Space heating (main system 1) (261)0.216 556.54 Space heating (secondary) (215) x (263)0.519 0 Water heating (219) x 470.92 (264)0.216 (261) + (262) + (263) + (264) =Space and water heating (265)1027.47 (221) x Space cooling 0.519 4.46 (266)Electricity for pumps, fans and electric keep-hot (231) x (267)0.519 97.87 (232) x Electricity for lighting (268)0.519 168.8 sum of (265)...(271) = Total CO2, kg/year 1298.6 (272)CO2 emissions per m² $(272) \div (4) =$ (273)17.53 El rating (section 14) (274)85 13a. Primary Energy **Energy Primary** P. Energy kWh/year factor kWh/year (211) x Space heating (main system 1) (261)1.22 3143.44 (215) x Space heating (secondary) (263)3.07 0 Energy for water heating (219) x2659.85 (264)1.22 (261) + (262) + (263) + (264) =Space and water heating (265)5803.29 (221) x Space cooling (266)3.07 26.38 (231) x Electricity for pumps, fans and electric keep-hot 3.07 578.91 (267)

(232) x

0

sum of (265)...(271) =

 $(272) \div (4) =$

SAP rating (Section 12)

Electricity for lighting

'Total Primary Energy

Primary energy kWh/m²/year

998.51

7407.1

100.01

(268)

(272)

(273)

(258)

82.56

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	roperty	Address	Flat 3-2	2-Lean				
Address: 1. Overall dwelling dime	oneione:								
1. Overall dwelling diffie	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) ====	76.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = [0	x	20 =	0	(6b)
Number of intermittent fa	ins				0	x -	10 =	0	(7a)
Number of passive vents	3			Ē	0	x -	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_					
		_	- \	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		.a to (),			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wall are	a (aitei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h					area	3	(17)
,	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•		•		0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			<u></u>
Number of sides shelters Shelter factor	ed		(20) = 1 -	in n 75 v (1	10)1 –			3	(19)
Infiltration rate incorporate	ting shelter factor		(20) = 13 (21) = (18)		19)] =			0.78	(20)
Infiltration rate modified f	•		(=1) (10	, n (=0)				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp						1			
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 1								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
	1 1 35 1 5.00		1			<u> </u>		J	

	ation rate (all		т —	1	i i	`	`			T 1		
0.15 Calculate effec	0.15 0.1	1 -	0.12 the appl	0.11 icable ca	0.11 Se	0.11	0.12	0.12	0.13	0.14		
If mechanica		-								ſ	0.5	(2:
If exhaust air he	eat pump using	Appendix N, (2	23b) = (23	a) × Fmv (e	equation (N5)) , othe	rwise (23b	o) = (23a)		Ī	0.5	(2:
If balanced with	heat recovery:	efficiency in %	allowing	for in-use f	actor (fror	n Table 4h) =			Ī	76.5	(2:
a) If balance	d mechanica	l ventilation	with he	at recov	ery (MV	HR) (24a	a)m = (2)	2b)m + (23b) × [1 – (23c)	÷ 100]	
24a)m= 0.27	0.26 0.2	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
b) If balance	d mechanica	l ventilatior	without	heat red	covery (I	ЛV) (24b)m = (22	2b)m + (2	23b)			
24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
c) If whole h if (22b)n	ouse extract n < 0.5 × (23		•	•				.5 × (23b))			
24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)n	ventilation or n = 1, then (2							0.5]				
24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
Effective air	change rate	- enter (24a	a) or (24	b) or (24	c) or (24	d) in box	(25)					
25)m= 0.27	0.26 0.2	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
3. Heat losse	s and heat lo	ss paramet	er:									
LEMENT	Gross area (m²)	Openir n	ngs n²	Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²-k		A X k kJ/K
Ooors				2.6	X	1.2	=	3.12				(2
Vindows Type	: 1			3.26	_x 1	/[1/(1.2)+	0.04] =	3.73				(2
Vindows Type	2			3.95	_x 1	/[1/(1.2)+	0.04] =	4.52				(2
Vindows Type	3			5.51	x1	/[1/(1.2)+	0.04] =	6.31				(2
Vindows Type	4			0.65	_x 1	/[1/(1.2)+	0.04] =	0.74				(2
Valls Type1	38.14	20.5	8	17.56	3 X	0.15	=	2.63				(2
Valls Type2	23.92	2.6		21.32	2 X	0.15	_ =	3.2			7 \square	(2
Valls Type3	5.95	0		5.95	x	0.15	<u> </u>	0.89	$\overline{}$		7 \square	(2
Valls Type4	29.51	0		29.51	1 x	0.15	=	4.43			7 M	(2
Roof	20.45	0		20.45	5 X	0.15	=	3.07			ī	(3
otal area of e	lements, m ²	· -		117.9	7							(3
Party wall				12.35	5 X	0	=	0			7	(3
arty floor				76.06	5						ī H	(3
arty ceiling				55.61	1				j		ī H	(3
for windows and * include the area					l lated using	ı formula 1	/[(1/U-valu	ue)+0.04] a	as given in	paragraph	3.2	
abric heat los	ss, W/K = S (A x U)				(26)(30)	+ (32) =				40.9	(3
abile float loc										_		
leat capacity	Cm = S(A x I	()					((28).	(30) + (32	2) + (32a)	(32e) =	26201.4	5 (3

n be u nerm:	al bridge		X Y I Cali	culated i	usina Ar	nendix l	K						23.27	
	Ū	,	,		= 0.15 x (3	•							23.21	(3
	abric hea			, ,	,	,			(33) +	(36) =			64.17	(3
entila	ition hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m=	81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
eat Ic	oss para	meter (H	HLP), W/	′m²K	_					Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	80.13	(;
0)m=	1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
umbe	er of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.05	(
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
I)m=	31	28	31	30	31	30	31	31	30	31	30	31		(
. Wa	ater heat	ing ener	gy requi	rement:								kWh/y	ear:	
	ad agai	nanay l	ΛĪ.										1	,
Sum	ied occu	ірапсу, і			,			١٥١٠	2040 /	FFA 40		38]	(
if TF	A > 13.9		+ 1.76 x	[1 - exp	(-0.0003	349 x (TI	-A -13.9)2)] + 0.0	JU13 X (IFA -13.	9)			
if TF if TF	A £ 13.9	9, N = 1								IFA -13.			1	,
if TF if TF nnua	A £ 13.9 I averag	9, N = 1 e hot wa	ater usaç	ge in litre	es per da	ay Vd,av	erage =)2)] + 0.0 (25 x N) to achieve	+ 36		90	.82]	(
if TF if TF inua duce	A £ 13.9 I averag the annua), N = 1 e hot wa al average	ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		90	.82		(
if TF if TF inua duce t more	A £ 13.9 I averag the annua e that 125 Jan	9, N = 1 e hot wa al average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed (bld) Jul	(25 x N) to achieve	+ 36		90	.82 Dec]	(
if TF if TF nnua duce t more	A £ 13.9 I averag the annua e that 125 Jan	9, N = 1 e hot wa al average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed (bld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	90	<u> </u>]	(
if TF inua duce more	A £ 13.9 I averag the annua e that 125 Jan	9, N = 1 e hot wa al average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed (bld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	90	<u> </u>]	
if TF if TF inua duce t more t wate	A £ 13.9 I averag the annual that 125 Jan er usage ir	e hot wa el average litres per p Feb n litres per 96.27	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 85.37	ay Vd,av Iwelling is hot and co Jun ctor from 1	rerage = designed (d) Jul Table 1c x 81.73	(25 x N) to achieve Aug (43)	+ 36 a water us Sep	Oct 92.63 Fotal = Su	90 Nov 96.27 m(44)112 =	Dec 99.9	1089.8	
if TF if TF inua duce t more t wate)m=	A £ 13.9 I averag the annual ethat 125 Jan er usage ir	e hot wa el average litres per p Feb n litres per 96.27	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 85.37	ay Vd,av Iwelling is hot and co Jun ctor from 1	rerage = designed (d) Jul Table 1c x 81.73	(25 x N) to achieve Aug (43) 85.37	+ 36 a water us Sep	Oct 92.63 Fotal = Su	90 Nov 96.27 m(44)112 =	Dec 99.9	1089.8	
if TF if TF inua duce t more t wate)m=	A £ 13.9 I average the annual of that 125 Jan er usage in 99.9 content of	e hot wa el average litres per p Feb n litres per 96.27	hot water person per Mar day for ea 92.63	ge in litre usage by day (all w Apr ach month 89 culated me	es per da 5% if the orater use, in the second M and V and V and V and V and V and V and V and V and V are second V and V and V are second V and V and V are second V are second V and V are second V and V are second V and V are second V and V are second V and V are second V and V are second V are second V and V are second V are second V are second V and V are second V are second V and V are second V are second V are second V are second V and V are second V are second V are second V and V are second V are second V are second V and V are second V and V are second V and V are second V and V are second V are second V are second V and V are second V and V are second V and V are second V are second V and V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V are second V and V are second V are second V are second V and V are second V are second V and V are second V and V are second V and V are second V and V are second V and V are second V and V are second V are second V are second V	ay Vd,av Iwelling is hot and co Jun ctor from 1 81.73	rerage = designed and designed	(25 x N) to achieve Aug (43) 85.37	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su th (see Ta	90 Nov 96.27 m(44)112 = ables 1b, 1	99.9 c, 1d)	1089.8	
if TF if TF innua duce t more t wate i)m= ergy o	A £ 13.9 I average the annual at that 125 Jan er usage in 99.9 content of 148.15	P, N = 1 e hot wa all average litres per p Feb a litres per 96.27 hot water 129.57	Mar 92.63 used - calc	ge in litre usage by day (all w Apr ach month 89 culated me	es per da 5% if the do ater use, l May Vd,m = fa 85.37 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44	(25 x N) to achieve Aug (43) 85.37	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su th (see Ta	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
if TF if TF if TF innua duce t more t wate t wate i)m= ergy (innua instant)m=	A £ 13.9 I average the annual at that 125 Jan 99.9 content of 148.15 taneous w 22.22	P, N = 1 e hot wa all average litres per p Feb a litres per 96.27 hot water 129.57 rater heatin	Mar 92.63 used - calc	ge in litre usage by day (all w Apr ach month 89 culated me	es per da 5% if the do ater use, l May Vd,m = fa 85.37 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44	(25 x N) to achieve Aug (43) 85.37 27m / 3600 102.63	+ 36 a water us Sep 89 0 kWh/mon 103.86	Oct 92.63 Fotal = Su th (see Ta	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
if TF if TF if TF if TF innua duce t more t wate t wate i)m= nstant ater	I A £ 13.9 I average the annual end that 125 I an end usage in 99.9 I an end usage in 148.15 I a	P, N = 1 e hot was all average litres per per per per per per per per per per	Mar day for ea 133.7 at point 20.06	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no	es per da 5% if the day the second of the control o	ay Vd,av lwelling is hot and co Jun ctor from 1 81.73 190 x Vd,r 96.52 r storage),	erage = designed in designed i	(25 x N) to achieve Aug (43) 85.37 DTm / 3600 102.63 boxes (46) 15.39	+ 36 a water us Sep 89 103.86 105.58	Oct 92.63 Fotal = Su 121.03 Fotal = Su 18.16	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF innua duce t more t wate t wate i)m= ergy c ergy i i)m= ater orag	I A £ 13.9 I average the annual that 125 Jan Per usage in 99.9 content of 148.15 taneous w 22.22 storage e volum	P, N = 1 e hot wa all average litres per p Feb a litres per 96.27 hot water 129.57 eater heatin 19.44 loss: e (litres)	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06	ge in litre usage by day (all w Apr ach month 89 culated me 116.57 of use (no	es per da 5% if the of vater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48	erage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage	(25 x N) to achieve Aug (43) 85.37 77m / 3600 102.63 boxes (46) 15.39 within sa	+ 36 a water us Sep 89 103.86 105.58	Oct 92.63 Fotal = Su 121.03 Fotal = Su 18.16	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	99.9 = c, 1d) 143.47		
if TF if TF if TF innua duce t more t wate t wate i)m= ergy (innua innu	I A £ 13.9 I average the annual enthat 125 Jan er usage in 99.9 content of 148.15 taneous w 22.22 storage en volumemunity h	e hot was all average litres per per per per per per per per per per	Mar day for ear 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw	es per da 5% if the d yater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	ay Vd,av welling is that and co Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS	erage = designed in designed i	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90.27 Mov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF innua duce t more t wate t wate i)m= ergy (innua ater orag committee herv	I A £ 13.9 I average the annual enthat 125 Jan er usage in 99.9 content of 148.15 taneous w 22.22 storage en volumemunity h	P, N = 1 e hot wa el average litres per p Feb n litres per 96.27 hot water 129.57 rater heatin 19.44 loss: e (litres) eating a p stored	Mar day for ear 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw	es per da 5% if the d yater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	ay Vd,av welling is that and co Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS	erage = designed in designed i	(25 x N) to achieve Aug (43) 85.37 77m / 3600 102.63 boxes (46) 15.39 within sa	+ 36 a water us Sep 89 103.86 105.58 ame vess	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90.27 Mov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF innua iduce it more it wate it wate is in= instant orage committee ater orage ater ater orage	I A £ 13.9 I average the annual the annual that 125 Jan 99.9 content of 148.15 taneous w 22.22 storage e volum munity he wise if no storage	Poor N = 1 Poor N = 1	Mar Mar Mar 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot water	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ink in dw er (this in	es per da 5% if the d yater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS .nter 110 nstantar	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF innua duce t more t wate t wate i)m= ergy (innua ater orag committee herw ater) If m	A £ 13.9 I average the annual the annual that 125 Jan 99.9 content of 148.15 taneous w 22.22 storage in the evolume munity he wise if no storage in anufactions.	P, N = 1 e hot wa el average litres per p feb n litres per 96.27 hot water 129.57 atter heatin 19.44 loss: e (litres) eating a o stored loss: urer's de	Mar Mar Mar 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot water	Apr Apr Ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in	es per da 5% if the d yater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e ncludes i	ay Vd,av lwelling is hot and co Jun ctor from 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS .nter 110 nstantar	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = sbles 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF innua iduce it more it wate it wate it wate is)m= aster orag commister ater orag in therw ater orag ater orag ater ater orag ater ater orag ater ater orag	A £ 13.9 I average the annual the annual that 125 Jan 99.9 content of 148.15 taneous w 22.22 storage we volume munity he wise if no storage nanufaction anufaction anufaction of the content of the co	Poor N = 1 e hot was all average litres per per feb a litres per 96.27 hot water 129.57 atter heatin 19.44 loss: e (litres) eating a control of stored loss: urer's defactor from water	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ncludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	erage = designed (a) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF nnua aduce it more it wate it wate it solution in stani in stan	I A £ 13.9 I average the annual the annual that 125 Jan 99.9 content of 148.15 taneous w 22.22 storage e volume munity he vise if no storage hanufacte that it is annual to the content of annufacte that is annual to the content of annufacte that is annual to the content of	Po N = 1 e hot was all average litres per per per per per per per per per per per per	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 89 culated me 116.57 of use (no 17.48 ag any se ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is that and color from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS Inter 110 Instantar wn (kWh	rerage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = sbles 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52 0		
if TF if TF innua aduce to more to water to the water to the water to committee water to the water to committee water to the water to t	I A £ 13.9 I average the annual enter that 125 Jan 199.9 content of 148.15 taneous w 22.22 storage en volume munity havise if no storage en anufaction	e hot was all average litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ag at point 20.06 includin nd no ta hot water storage eclared of factor fr	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ncludes i or is known	ay Vd,av liwelling is that and color from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS Inter 110 Instantar wn (kWh	rerage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = sbles 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
if TF if TF if TF nnua educe to wate t	I A £ 13.9 I average the annual enter that 125 Jan 199.9 content of 148.15 taneous w 22.22 storage en volume munity havise if no storage en anufaction	e hot was all average litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is that and color from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS Inter 110 Instantar wn (kWh	rerage = designed sold) Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	+ 36 a water us Sep 89 103.86 105.58 ame vess ers) ente	Oct 92.63 Fotal = Sur 121.03 Fotal = Sur 18.16	90 Nov 96.27 m(44) ₁₁₂ = sbles 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52 0		

Energy lost from v	ater storan	≥ k\/\h/v	ear			(47) x (51)) x (52) x (53) -		0	1	(54)
Enter (50) or (54)	_	e, Kvvii/y	cai			(1 1) X (01)) X (32) X (55) =		0		(55)
Water storage loss	` ,	for each	month			((56)m = ((55) × (41)ı	m		0		(00)
	0 0	Ι ο	0	0	0	0	0	0	0	0		(56)
If cylinder contains dec											l ix H	,
(57)m= 0	0 0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit los	s (annual) fr	om Table		•	•	•	•			0		(58)
Primary circuit los				59)m = ((58) ÷ 36	65 × (41)	m					
(modified by fac	tor from Tab	ole H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcula	ated for eacl	h month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.91 44	.31 47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat require	for water h	neating ca	alculated	for eac	h month	(62)m =	: 0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05 17	3.88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input calcu	ated using App	pendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additional line	es if FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	heater											
(64)m= 199.05 17	3.88 180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		_
						Outp	out from wa	ater heate	r (annual)₁	12	1973.65	(64)
Heat gains from w	ater heating	j, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1 + 0.8 x	(46)m	+ (57)m	+ (59)m	1	
					` '	. (0.)	.,	. [(. •)	() . ,	(/		
(65)m= 61.99 54	.16 56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43	,	(65)
(65)m= 61.99 54 include (57)m in				<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
	calculation	of (65)m	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m ir	calculation (see Table	of (65)m 5 and 5a	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (7)	calculation (see Table	of (65)m 5 and 5a	only if c	<u> </u>	40.15	45	45.5	52.04	55.8	60.43		(65)
include (57)m in 5. Internal gains Metabolic gains (1 Jan F	calculation (see Table able 5), Wa	of (65)m 5 and 5a tts	only if o	ylinder i	40.15 s in the o	45 dwelling	45.5 or hot w	52.04 ater is fr	55.8 rom com	60.43 munity h		(65)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F	calculation (see Table able 5), Wareb Mar 3.03 143.03	of (65)m 5 and 5a tts Apr 143.03	only if c): May 143.03	Jun 143.03	40.15 s in the 0	45 dwelling Aug 143.03	45.5 or hot w Sep 143.03	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal	calculation (see Table able 5), Wareb Mar 3.03 143.03	of (65)m 5 and 5a tts Apr 143.03	only if c): May 143.03	Jun 143.03	40.15 s in the 0	45 dwelling Aug 143.03	45.5 or hot w Sep 143.03	52.04 ater is fr	55.8 om com	60.43 munity h		
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A 77 33.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72	only if co.): May 143.03 L, equat 19.22	Jun 143.03 ion L9 o	40.15 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 Iso see	45.5 or hot w Sep 143.03 Table 5	52.04 ater is fr Oct 143.03	55.8 com com Nov 143.03	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A 77 33.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72	only if co.): May 143.03 L, equat 19.22	Jun 143.03 ion L9 o	40.15 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 Iso see	45.5 or hot w Sep 143.03 Table 5	52.04 ater is fr Oct 143.03	55.8 com com Nov 143.03	60.43 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Append 292.44	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11	55.8 rom com Nov 143.03	60.43 munity h Dec 143.03		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Append 292.44	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11	55.8 rom com Nov 143.03	60.43 munity h Dec 143.03		(66) (67)
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include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g	calculation (see Table stable 5), Wareb Mar 3.03 143.03 culated in A 33.97 calculated i 3.21 309.97 culated in A 69 51.69	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table	52.04 ater is fr Oct 143.03 38.85 ole 5 258.11 5	55.8 rom com Nov 143.03 45.34	Dec 143.03 48.34 301.04		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g	calculation (see Table able 5), Wareb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 culated in A .69 51.69 ains (Table 3 3	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor	calculation (see Table able 5), Wareb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 culated in A .69 51.69 ains (Table 3 3	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 lculated in A .69 51.69 ains (Table 3 3 ration (nega	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69 5a) 3 ative value	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor (71)m= -95.35 -99 Water heating gain	calculation (see Table lable 5), Wa leb Mar 3.03 143.03 culated in A .77 33.97 calculated i 3.21 309.97 lculated in A .69 51.69 ains (Table 3 3 ration (nega	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 292.44 Appendix 51.69 5a) 3 ative value	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	55.8 com com Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapor (71)m= -95.35 -99 Water heating gain	calculation (see Table sable 5), Wareb Mar 3.03 143.03 culated in Ar 77 33.97 calculated in Ar 69 51.69 ains (Table 3 3 ration (negations) 63.25 -95.35 65 75.62	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ble 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 3 -95.35	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35	55.8 om com Nov 143.03 45.34 280.24 51.69 3 -95.35	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapol (71)m= -95.35 -99 Water heating gain (72)m= 83.31 80 Total internal gains	calculation (see Table sable 5), Wareb Mar 3.03 143.03 culated in Ar 77 33.97 calculated in Ar 69 51.69 ains (Table 3 3 ration (negations) 63.25 -95.35 65 75.62	of (65)m 5 and 5a tts	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ble 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69 3 -95.35	52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35	55.8 om com Nov 143.03 45.34 280.24 51.69 3 -95.35	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (7 Jan F (66)m= 143.03 14 Lighting gains (cal (67)m= 47.03 41 Appliances gains (68)m= 314.94 31 Cooking gains (cal (69)m= 51.69 51 Pumps and fans g (70)m= 3 Losses e.g. evapol (71)m= -95.35 -99 Water heating gain (72)m= 83.31 80 Total internal gains	calculation (see Table able 5), Wa eb Mar 3.03	of (65)m 5 and 5a tts Apr 143.03 ppendix 25.72 n Appendix 51.69 5a) 3 ative valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 3 ole 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69 3 -95.35	45 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 3 -95.35 60.48 1+ (68)m -	45.5 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 3 -95.35 63.2 + (69)m + (52.04 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 3 -95.35 69.95 70)m + (7	55.8 Tom com Nov 143.03 45.34 280.24 51.69 3 -95.35 77.5 1)m + (72)	60.43 munity h Dec 143.03 48.34 301.04 51.69 3 -95.35		(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

	_														
Southwest _{0.9}	•	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwest _{0.9}	0.77	X	0.6	65	X	9	2.85]		0.24	x	0.7	=	7.03	(79)
Southwest _{0.9}	0.77	X	5.5	51	X	6	9.27]		0.24	x	0.7	=	44.43	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	4	4.07			0.24	x	0.7	=	28.27	(79)
Southwest _{0.9}	0.77	X	0.6	35	x	4	4.07			0.24	x	0.7	=	3.34	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	3	1.49] [0.24	x	0.7	=	20.2	(79)
Southwest _{0.9}	0.77	X	0.6	65	x	3	1.49			0.24	x	0.7		2.38	(79)
	'			_	•										
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	ım(74)m .	(82)m			_	
(83)m= 45.3	3 83.51	130.97	190.29	238.71	24	18.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	r (84)m =	= (73)m	+ (8	33)m	, watts						_	_	
(84)m= 592.9	98 626.44	652.89	679.88	695.21	6	74.9	644.12	614	.78	587.98	566.07	560.89	571.02		(84)
7. Mean in	ternal tem	oerature	(heating	season)										
Temperatu			`		<i>'</i>	area f	from Tab	ole 9,	, Th′	1 (°C)				21	(85)
Utilisation	•	•			-					` ,					
Jai		Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	7	
(86)m= 0.99	0.99	0.98	0.95	0.87		0.7	0.53	0.5	Ť	0.81	0.96	0.99	0.99	1	(86)
Mean inter	nal tempe	rature in	livina ar	oa T1 /f/	صالد	w cto	ne 3 to 7	7 in T	able) (Oc)		1	<u> </u>	_	
(87)m= 20.0	_ -	20.33	20.59	20.83	_	0.96	20.99	20.9		20.91	20.63	20.29	20.01	٦	(87)
` ′		<u> </u>	<u> </u>	<u> </u>			l					1 -00			(- /
Temperatu	-	, , , , , , , , , , , , , , , , , , , 		1	_		i			<u> </u>	00.04	1 00 04	00.00	7	(00)
(88)m= 20.0	2 20.03	20.03	20.04	20.04		0.05	20.05	20.0	05	20.05	20.04	20.04	20.03		(88)
Utilisation		1	1		_	<u> </u>		9a)						7	
(89)m = 0.99	0.99	0.97	0.93	0.83	C).62	0.42	0.4	16	0.74	0.94	0.98	0.99		(89)
Mean inter	nal tempe	rature in	the rest	of dwelli	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)				
(90)m= 18.7	5 18.9	19.18	19.56	19.87	2	0.02	20.05	20.0	05	19.98	19.63	19.14	18.72		(90)
										f	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inter	nal tempe	rature (fo	r the wh	ole dwe	llind	a) = fl	LA × T1	+ (1	– fL	A) x T2					
(92)m= 19.0		19.47	19.83	20.11	_	0.26	20.29	20.2		20.22	19.88	19.43	19.05	7	(92)
Apply adju	stment to t	:he mear	ı ı interna	l temper	ı atu	re fro	m Table	4e,	<u> </u>	re appro	priate	<u> </u>	<u> </u>	_	
(93)m= 18.9		19.32	19.68	19.96	_	0.11	20.14	20.	$\overline{}$	20.07	19.73	19.28	18.9	7	(93)
8. Space h	eating req	uirement													
Set Ti to th	e mean in	ternal ter	mperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the utilisati	on factor f	or gains	using Ta	able 9a			·					·	1	7	
Jai		Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisation t		1		_	_		1					1	1	7	(5.1)
(94)m= 0.99		0.97	0.93	0.82	().62	0.43	0.4	7	0.74	0.93	0.98	0.99		(94)
Useful gair	1	<u> </u>	`	·		20.74	070.00		00 1	405.00	500.47	1 540 50	T = 0 = 44	7	(05)
(95)m= 585.6		631.58	629.12	571.3	<u> </u>	20.71	278.09	292	.02	435.93	526.17	548.59	565.11		(95)
Monthly av (96)m= 4.3		i	ri e	ı	_		16.6	16.	<u>, I</u>	111	10.6	7.4	4.0	٦	(96)
` ′		6.5	8.9	11.7		14.6	16.6			14.1	10.6	7.1	4.2	J	(30)
Heat loss r (97)m= 1192.	34 1152.11			661.02	_	, VV =	=[(39)m : 279.77	X [(9)	' T	- (96)M 473.87	730.68	979.15	1187.25	3	(97)
(37)111= [1192.	07 1102.11	1040.33	004.04	001.02		JU.UZ	213.11	294	.01	710.01	130.00	3/3.13	1 107.23	1	(01)

ı	451.39	360.87	304.12	169.14	66.76	0	0	0	0)m] x (4 ²	310.01	462.87		
							l	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2277.32	(98
Space	heatin	g require	ement in	kWh/m²	/year							Ī	29.94	– (99
		oling req			•							L		
		r June, J			See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
leat l	oss rate	Lm (ca	lculated	using 25	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
00)m=	0	0	0	0	0	743.01	584.92	599.29	0	0	0	0		(10
	tion fac	tor for lo	ss hm											
01)m=	0	0	0	0	0	0.83	0.9	0.87	0	0	0	0		(10
		mLm (V		<u> </u>										
02)m=	0	. 0	0	0	0	614.95	527.28	524.16	0	0	0	0		(1
	(solar o			for appli				e Table						(1
)3)m=		0	0		0	713.8	680.73	645.01	0 (b) 0.0	0	0	0	(11)m	(1
		g require zero if (iweiiing,	CONTINUO	ous (KVV	(n) = 0.0	24 X [(10)3)III – (102)m] x	(41)III	
) 04)m=	0	0	0	0	0	71.18	114.17	89.91	0	0	0	0		
'							I.		Total	l = Sum(104)	=	275.25	(1
oled	fraction	า							f C =	cooled	area ÷ (4	1) =	0.59	(1
		actor (Ta		<u> </u>										
)6)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		٦.
	aaalina	roguiron	nant for	manth	(101)m	(10E)	(106)	~	I ota	I = Sum(104)	= [0	(1
7)m=	0	requirer 0	0	0	0	10.41	16.7	13.15	0	0	0	0		
		Ů	Ů		Ů					l = Sum(=	40.26	(1
200	cooling													
		requirer	nent in k	(\/\h/m2/\	/ear					`		L F		╡`
		•		(Wh/m²/)		retome i	ncluding	miero ((107)) ÷ (4) =	*0560* /	[0.53	╡`
ı. Ene	ergy rec	quiremer		•		/stems i	ncluding	micro-C	(107)	`	· 0.40- /	[╡`
. Ene	ergy rec	quiremer ng:	nts – Indi	ividual h	eating sy				(107)	`	· 0.20- /	Ī.		(1
n. Ene Space racti	ergy receive heating on of sp	quiremer ng: pace hea	nts – Indi	ividual h	eating sy				(107 <u>)</u> CHP)	`	TOMOS J	[0.53	(1
Ene ipace raction	ergy receive heating on of spo	quirements ng: bace head bace head	nts – Indi nt from so nt from m	ividual h econdary	eating sy y/supple em(s)		system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Tokor J	[[[[0.53	(1)
pace Fracti Fracti Fracti	ergy receive heating on of spon of too	quirements ng: pace head pace head tal heatin	nts - Indi	ividual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system		(107) CHP) - (201) =) ÷ (4) =	Toko j		0.53 0 1	(1)
a. End Space Fraction Fraction Efficie	ergy receive heating on of spon of to ency of received	quirement ng: pace heat pace heat tal heatin main spa	nts - Indicate from some of the second secon	ividual h econdary nain syst main syst ing syste	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Toko j		0.53 0 1 1 89.5	(1) (2) (2) (2) (2)
a. Energy Fraction Fraction Fraction Efficient	ergy receive heating on of spon of too on of too once of the ency of spon of s	quirement ng: pace heat pace heat tal heatin main spa	nts - Indicate from some from the from	econdary nain systemain systemain systementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Toko j		0.53 0 1 1 89.5 0	(1) (2) (2) (2) (2) (2) (2) (2)
a. Energy Fraction Fraction Fraction Efficient	ergy receive heating on of spon of too on of too once of the ency of spon of s	quirement ng: pace heat pace heat tal heatin main spa	nts - Indicate from some from the from	econdary nain systemain systemain systementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) = 02) × [1 -) ÷ (4) =	Toko j		0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Efficie Coolir	ergy receive heating on of spon of to ency of another to ency of spon og System Jan	uiremen ng: pace hea pace hea tal heatin main spa seconda em Energ	nts – Indi at from so at from m ace heat ry/supplo gy Efficie Mar	econdary nain systemain systemain systementar ency Rai	eating sy y/supple em(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	Nov	[[[[Dec	0.53 0 1 1 89.5 0	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Encorraction Fraction of the Cooling C	ergy receive heating on of spon of to ency of spon of	uiremen ng: pace hea pace hea tal heatii main spa seconda em Ener Feb g require	ats – Indicate from many from lace heat ry/supple gy Efficier Mar	econdary nain systemain systementar ementar ency Rate	eating sy y/supple em(s) stem 1 em 1 y heating tio May d above	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (2) Aug	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	Dec	0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Efficie	ergy receive heating on of spon of to ency of another to ency of spon og System Jan	uiremen ng: pace hea pace hea tal heatin main spa seconda em Energ	nts – Indi at from so at from m ace heat ry/supplo gy Efficie Mar	econdary nain systemain systemain systementar ency Rai	eating sy y/supple em(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 - (204) = (2 ¹)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] =			0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Efficie Coolir	ergy receive heating on of spon of to ency of an ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of t	uiremen ng: pace hea pace hea tal heatin main spa seconda em Ener Feb g require 360.87	at from so at from many from ace heat ry/supplo gy Efficient Mar ement (co 304.12	econdary nain systemain systementar ency Rate Apr alculatee	y/supple em(s) stem 1 em 1 y heating tio May d above)	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (2) Aug	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	Dec 462.87	0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Encertification in the contracti	ergy receive heating on of spon of to ency of spon of	pace head pace head tal heating main special em Energy Feb grequire 360.87	at from so at from many from ace heat ry/supplo gy Efficient Mar ement (co 304.12	econdary nain systemain systementar ency Rate Apr alculatee	y/supple em(s) stem 1 em 1 y heating tio May d above)	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 152.15	Nov 310.01	Dec 462.87	0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Efficie Coolir	ergy receive heating on of spon of to ency of an ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of spon of the ency of t	uiremen ng: pace hea pace hea tal heatin main spa seconda em Ener Feb g require 360.87	at from so at from mace heat ry/supple gy Efficie Mar ement (c 304.12	econdary nain systemain systematic systementar ency Rate Apr ealculatee 169.14 00 ÷ (20	y/supple em(s) stem 1 em 1 y heating tio May d above; 66.76	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov 310.01	Dec 462.87	0.53 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Efficie Coolir Coolir Coolir Coolir	ergy receive heating on of spon of too on on of too on on of too on on of too on on of too on on of too on on of too on on of too on on of too on on on of too on on on of too on on on of too on on on on on on on on on on on on o	repuirement of the property of	at from so at from many from ace heat ry/supploy gy Efficient Mar ement (company 304.12 4)] } x 1 339.8	econdary nain systemain systemain systementar ency Rate Apr calculated 169.14 00 ÷ (20 188.99	y/supple em(s) stem 1 em 1 y heating tio May d above 66.76 06) 74.59	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 152.15	Nov 310.01	Dec 462.87	0 1 1 89.5 0 4.73 kWh/ye	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Space Fractic Fractic Fractic Efficie Coolir Space	ergy receive heating on of spon of too on on of too on on of too on on of too on on of too on on of too on on of too on on of too on on of too on on on of too on on on of too on on on of too on on on on on on on on on on on on o	requirements pace head tal heating the main space on the mean space of the mean spa	at from so at from many from ace heat ry/supploy gy Efficient Mar ement (company 304.12 4)] } x 1 339.8	econdary nain systemain systemain systementar ency Rate Apr calculated 169.14 00 ÷ (20 188.99	y/supple em(s) stem 1 em 1 y heating tio May d above 66.76 06) 74.59	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 152.15	Nov 310.01	Dec 462.87	0 1 1 89.5 0 4.73 kWh/ye	(1) (2) (2) (2) (2) (2) (2) (2)

Output from water heat	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38	1	
Efficiency of water hea										1	89.5	(2
217)m= 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(2
uel for water heating,					•	•	•		•	•	•	
$219)m = (64)m \times 100$ $219)m = 222.41 194.28$) ÷ (217) 202.13	m 179.28	173.58	152.88	146.47	163.28	165.08	187.98	200.66	217.18	1	
, <u> </u>					ļ		l = Sum(2				2205.19	(2
Space cooling fuel, k		nth.										_
$221)m = (107)m \div (209)$ $221)m = 0 0$	0	0	0	2.2	3.53	2.78	0	0	0	0	1	
221)m= 0 0	U	0	U	2.2	3.53		I = Sum(2)				8.52	(2:
Annual totals							•		Wh/year	•	kWh/yea	
Space heating fuel use	d, main	system	1						vvii y cai		2544.49	
Water heating fuel use	d										2205.19	Ī
Space cooling fuel use	d										8.52	7
Electricity for pumps, fa	ans and	electric	keep-ho	t								
mechanical ventilation	n - balan	ced, ext	ract or p	ositive i	nput fror	n outside	Э			162.85	1	(2:
central heating pump:										30	j	(2:
Total electricity for the	above, k	κWh/yea	ır			sum	of (230a).	(230g) =			192.85	(2:
Electricity for lighting											332.22	
Electricity for lighting 10a. Fuel costs - indiv	ridual he	eating sy	stems:								332.22	(23
Electricity for lighting 10a. Fuel costs - indiv	ridual he	eating sy	stems:	E	ol.			Euol B	trioo			(23
, ,	ridual he	eating sy	stems:	Fu kW	el /h/year			Fuel P (Table			332.22 Fuel Cost £/year	(23
10a. Fuel costs - indiv		<u> </u>	stems:	kW					12)	x 0.01 =	Fuel Cost	(23
10a. Fuel costs - indiv	system 1		stems:	kW (21	/h/year			(Table	12)	x 0.01 = x 0.01 =	Fuel Cost £/year	(24
10a. Fuel costs - indiv Space heating - main s Space heating - main s	system 1 system 2		stems:	kW (21:	/h/year 1) x			(Table	12)		Fuel Cost £/year 88.55	
, ,	system 1 system 2 dary	2	stems:	kW (21:	/h/year 1) x 3) x 5) x			(Table	12)	x 0.01 =	Fuel Cost £/year 88.55] (24] (24
10a. Fuel costs - indiv Space heating - main s Space heating - main s Space heating - second	system 1 system 2 dary	2	stems:	(21:	/h/year 1) x 3) x 5) x			(Table 3.4 0 13.	12)	x 0.01 = x 0.01 =	Fuel Cost £/year 88.55 0 0 76.74] (24] (24] (24]
Space heating - main some space heating - main some space heating - second Water heating cost (other second cost)	system 1 system 2 dary ner fuel)	2	stems:	(21:	/h/year 1) x 3) x 5) x 9)			(Table 3.4 0 13. 3.4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	12) 88 19 19	x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 88.55	(24
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling pumps, fans and electrons)	system 1 system 2 dary ner fuel) ric keep-	<u>?</u> -hot		(21: (21: (21: (21: (22: (23:	/h/year 1) x 3) x 5) x 9) 1)	licable a	nd apply	(Table 3.4 0 13. 13. 13.	12) 18 19 19 19	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44	(24 (24 (24
Space heating - main some space heating - main some space heating - main some space heating - second Vater heating cost (other space cooling pumps, fans and electrical off-peak tariff, list each	system 1 system 2 dary ner fuel) ric keep-	<u>?</u> -hot		(21: (21: (21: (21: (22: (23:	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 13.	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 =	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44	(2· (2· (2· (2·
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling pumps, fans and electric off-peak tariff, list eatenergy for lighting	system 1 dary her fuel) ric keep- ch of (23	-hot 30a) to (230g) se	kW (21) (21) (21) (22) (23) eparately	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44 Table 12a	(2.4 (2.4 (2.4
Space heating - main some space heating - main some space heating - main some space heating - second Water heating cost (other space cooling)	system 1 dary her fuel) ric keep- ch of (23	hot 30a) to (able 12)	230g) se	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44 Table 12a 43.82	(24) (24) (24) (24) (24) (24)
Space heating - main some space heating - main some space heating - main some space heating - second vater heating cost (other space cooling pumps, fans and electric off-peak tariff, list eating for lighting additional standing characteristics.	system 1 dary her fuel) ric keep- ch of (23	hot 30a) to (able 12)	230g) se nd (254)	kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) 1) y as app		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44 Table 12a 43.82	(24) (24) (24) (24) (24) (24)
Space heating - main some space heating - main some space heating - second water heating cost (other space cooling pumps, fans and electric off-peak tariff, list eatenergy for lighting additional standing characters.	system 1 system 2 dary ner fuel) ric keep- ch of (2: arges (Tages)	hot 30a) to (able 12)	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44 Table 12a 43.82 120	(2-1) (2-1) (2-1) (2-1) (2-1) (2-1) (2-1) (2-1)
Space heating - main some space heating - main some space heating - main some space heating - second vater heating cost (other space cooling pumps, fans and electrif off-peak tariff, list eating spendix for lighting additional standing characteristics.	system 1 system 2 dary ner fuel) ric keep- ch of (23 arges (Tages) eat lines	-hot 30a) to (able 12) (253) ar	230g) se nd (254) (245)(kW (21) (21) (21) (22) (23) eparately (23)	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 13. 14. 15. 16. 17. 18. 18. 19. 19. 19. 19. 19. 19	12) 18 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	Fuel Cost £/year 88.55 0 0 76.74 1.12 25.44 Table 12a 43.82 120	(2 (2 (2 (2 (2 (2 (2

SAP rating (Section 12) (258)82.79 12a. CO2 emissions – Individual heating systems including micro-CHP **Energy Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year (211) x Space heating (main system 1) (261) 0.216 549.61 Space heating (secondary) (215) x (263) 0.519 0 Water heating (219) x (264)476.32 0.216 (261) + (262) + (263) + (264) =Space and water heating (265)1025.93 (221) x Space cooling (266)0.519 4.42 Electricity for pumps, fans and electric keep-hot (231) x 100.09 (267)0.519 (232) x Electricity for lighting (268)0.519 172.42 sum of (265)...(271) = Total CO2, kg/year 1302.87 (272)CO2 emissions per m² $(272) \div (4) =$ (273)17.13 El rating (section 14) (274)86

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	3104.28 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2690.34 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5794.62 (265)
Space cooling	(221) x	3.07	26.16 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	592.06 (267)
Electricity for lighting	(232) x	0 =	1019.91 (268)
'Total Primary Energy	sum	of (265)(271) =	7432.75 (272)
Primary energy kWh/m²/year	(272)	÷ (4) =	97.72 (273)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	roperty	Address	: Flat 4-	1-Lean				
Address: 1. Overall dwelling dime	ansions:								
1. Overall dwelling diffie	: IISIOIIS.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	54.34	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	141.28	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	7 + [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- - - -	0	<u> </u>	0	x	20 =	0	(6b)
Number of intermittent fa	ns				0	x ′	10 =	0	(7a)
Number of passive vents	.			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	X 4	40 =	0	(7c)
				_			A: I-		_
Lefter Const. Les Const. Const.	(Ca) (Cb) (7-\./ 7 L\.	(7 -)	_				nanges per ho	_
	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)$ seen carried out or is intended, process			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		()/			(-)	/		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi	-	o ine grea	iter wall are	a (anter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			740
Number of sides sheltere Shelter factor	ea each		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	s) x (20) =				0.13	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
	•			_	_	-		-	

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2h) _ (22c	a) v Emy (aguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=			(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

Ventila	ition hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		_
Heat Ic	oss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	81.67	(39)
(40)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		_
Numbe	er of day	s in moi	nth (Tab	le 1a)						Average =	Sum(40) ₁ .	12 /12=	1.5	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ater heat	ing ene	rgy requi	irement:								kWh/ye	ar:	
Assum	ed occu	ıpancv. I	N								1	82		(42)
if TF		9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		.02		()
								(25 x N)				'.38		(43)
		_	hot water person per			_	_	to achieve	a water us	se target o	f			
	<u> </u>			<u> </u>	<u> </u>	i .		Ι Δα	Can	Oat	Nav	Daa		
Hot wate	Jan er usage ii	Feb	Mar day for ea	Apr ach month	May <i>Vd.m</i> = fa	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
(44)111=	05.12	02.02	70.92	73.03	12.13	09.04	09.04	12.13			m(44) ₁₁₂ =	L	928.53	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			ables 1b, 1		020.00	`
(45)m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
lf instant	taneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1217.45	(45)
(46)m=	18.93	16.56	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		(46)
	storage													
_		` ,		•			_	within sa	ame ves	sel		0		(47)
		_	ind no ta hot wate		-			(47) ombi boil	ers) ente	er '0' in (47)			
	storage													
•			eclared l		or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
•			storage	-		or io not		(48) x (49)) =			0		(50)
			eclared of factor fr	-								0		(51)
			ee secti		_ (,,,,,,	-77					<u> </u>		(0.)
Volume	e factor	from Ta	ble 2a									0		(52)
Tempe	erature fa	actor fro	m Table	2b								0		(53)
•			storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
	(50) or ((54) in (5	55)									0		(55)
	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m 				

	tains dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circ	cuit loss (ar	nual) fro	m Table	3		-	-	-	-		0		(58)
Primary circ	cuit loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified	by factor f	rom Tabl	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss	calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 43.3	37.75	40.22	37.4	37.06	34.34	35.49	37.06	37.4	40.22	40.45	43.37		(61)
Total heat r	equired for	water he	eating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 169	.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		(62)
Solar DHW in	out calculated	using App	endix G oı	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add addition	nal lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)	_	_			
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	n water hea	ter										_	
(64)m= 169	.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		_
							Outp	out from wa	ater heate	r (annual) ₁	12	1681.59	(64)
Heat gains	from water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	د [(46)m	+ (57)m	+ (59)m]	
(65)m= 52.8	31 46.14	47.93	42.37	40.95	35.93	34.21	38.34	38.77	44.34	47.54	51.49		(65)
include (57)m in cal	culation of	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Interna	l gains (see	e Table 5	and 5a):									
Metabolic g	ains (Table	e 5). Wat	ts										
Ja		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Doo		
(66)m= 109.	08 109.08	109.08	400.00					l Ocb	1 001	1 .404	Dec		
			109.08	109.08	109.08	109.08	109.08	109.08	109.08	109.08	109.08		(66)
Lighting ga	ins (calcula					l	109.08	109.08	—	-			(66)
(67)m= 35.3	<u>`</u> -					l	109.08	109.08	—	-			(66) (67)
· · ·	32 31.37	ted in Ap	pendix 19.32	L, equat 14.44	ion L9 oi 12.19	r L9a), a 13.17	109.08 Iso see	109.08 Table 5 22.98	109.08 29.18	109.08	109.08		` /
(67)m= 35.3	31.37 gains (calc	ted in Ap	pendix 19.32	L, equat 14.44	ion L9 oi 12.19	r L9a), a 13.17	109.08 Iso see	109.08 Table 5 22.98	109.08 29.18	109.08	109.08		` /
(67)m= 35.3 Appliances	31.37 gains (calc 54 239	ted in Ap 25.51 culated in 232.81	19.32 Appendix 219.64	L, equat 14.44 dix L, eq 203.02	12.19 uation L	r L9a), a 13.17 13 or L1 176.96	109.08 Iso see 17.12 3a), also	109.08 Table 5 22.98 See Ta 180.69	29.18 ble 5 193.86	109.08 34.05	109.08 36.3		(67)
(67)m= 35.3 Appliances (68)m= 236.	32 31.37 gains (calc 54 239 ins (calcula	ted in Ap 25.51 culated in 232.81	19.32 Appendix 219.64	L, equat 14.44 dix L, eq 203.02	12.19 uation L	r L9a), a 13.17 13 or L1 176.96	109.08 Iso see 17.12 3a), also	109.08 Table 5 22.98 See Ta 180.69	29.18 ble 5 193.86	109.08 34.05	109.08 36.3		(67)
(67)m= 35.: Appliances (68)m= 236. Cooking ga	32 31.37 gains (calconding) 54 239 ins (calcula) 73 47.73	ted in Ap 25.51 culated in 232.81 ated in Ap	19.32 Appendix 219.64 oppendix 47.73	L, equat 14.44 dix L, eq 203.02 L, equat	ion L9 or 12.19 uation L 187.4 ion L15	r L9a), a 13.17 13 or L1 176.96 or L15a)	109.08 Iso see 17.12 3a), also 174.51	109.08 Table 5 22.98 See Ta 180.69 ee Table	109.08 29.18 ble 5 193.86	109.08 34.05 210.48	109.08 36.3 226.11		(67) (68)
(67)m= 35.3 Appliances (68)m= 236. Cooking ga (69)m= 47.	32 31.37 gains (calcompared) 54 239 ins (calculated) 73 47.73 fans gains	ted in Ap 25.51 culated in 232.81 ated in Ap	19.32 Appendix 219.64 oppendix 47.73	L, equat 14.44 dix L, eq 203.02 L, equat	ion L9 or 12.19 uation L 187.4 ion L15	r L9a), a 13.17 13 or L1 176.96 or L15a)	109.08 Iso see 17.12 3a), also 174.51	109.08 Table 5 22.98 See Ta 180.69 ee Table	109.08 29.18 ble 5 193.86	109.08 34.05 210.48	109.08 36.3 226.11		(67) (68)
(67)m= 35 Appliances (68)m= 236 Cooking ga (69)m= 47 Pumps and	32 31.37 gains (calcordate) 54 239 ins (calculate) 73 47.73 fans gains 3	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5	19.32 Appendix 219.64 oppendix 47.73 5a)	L, equat 14.44 dix L, eq 203.02 L, equat 47.73	12.19 uation L 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	109.08 Iso see 17.12 3a), also 174.51), also se 47.73	109.08 Table 5	29.18 ble 5 193.86 5 47.73	109.08 34.05 210.48 47.73	109.08 36.3 226.11 47.73		(67) (68) (69)
(67)m= 35.3 Appliances (68)m= 236. Cooking ga (69)m= 47.3 Pumps and (70)m= 3	gains (calculations) gains (calculations) (calculations) 47.73 fans gains avaporations	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5	19.32 Appendix 219.64 oppendix 47.73 5a)	L, equat 14.44 dix L, eq 203.02 L, equat 47.73	12.19 uation L 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	109.08 Iso see 17.12 3a), also 174.51), also se 47.73	109.08 Table 5	29.18 ble 5 193.86 5 47.73	109.08 34.05 210.48 47.73	109.08 36.3 226.11 47.73		(67) (68) (69)
(67)m= 35.3 Appliances (68)m= 236.3 Cooking ga (69)m= 47.3 Pumps and (70)m= 3 Losses e.g.	gains (calculation) gains (calculation) fans gains a evaporation 72 -72.72	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5 3 on (negat	19.32 Appendix 219.64 Expendix 47.73 Sa) 3 Saive value	L, equat 14.44 dix L, eq 203.02 L, equat 47.73	12.19 uation L 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	109.08 Iso see 17.12 3a), also 174.51), also se 47.73	109.08 Table 5 22.98 See Ta 180.69 ee Table 47.73	109.08 29.18 ble 5 193.86 5 47.73	109.08 34.05 210.48 47.73	109.08 36.3 226.11 47.73		(67) (68) (69) (70)
(67)m= 35 Appliances (68)m= 236 Cooking ga (69)m= 47 Pumps and (70)m= 3 Losses e.g. (71)m= -72	gains (calculations) gains (calculations) (calculations) 47.73 fans gains avaporation 72 -72.72 ang gains (7)	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5 3 on (negat	19.32 Appendix 219.64 Expendix 47.73 Sa) 3 Saive value	L, equat 14.44 dix L, eq 203.02 L, equat 47.73	12.19 uation L 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	109.08 Iso see 17.12 3a), also 174.51), also se 47.73	109.08 Table 5 22.98 See Ta 180.69 ee Table 47.73	109.08 29.18 ble 5 193.86 5 47.73	109.08 34.05 210.48 47.73	109.08 36.3 226.11 47.73		(67) (68) (69) (70)
(67)m= 35.3 Appliances (68)m= 236.3 Cooking ga (69)m= 47.3 Pumps and (70)m= 3 Losses e.g. (71)m= -72. Water heat	gains (calculated page 131.37) gains (calculated page 133) 47.73 fans gains 3 evaporation 4 evaporation 4 evaporat	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5 3 on (negat -72.72 Table 5) 64.43	a Appendix 219.64 ppendix 47.73 5a) 3 tive valu	L, equat 14.44 dix L, eq 203.02 L, equat 47.73 3 es) (Tab	12.19 uation L 187.4 ion L15 47.73 3 le 5) -72.72	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 3 -72.72	109.08 Iso see 17.12 3a), also 174.51), also se 47.73	109.08 Table 5 22.98 See Ta 180.69 Ee Table 47.73 3 -72.72	109.08 29.18 ble 5 193.86 5 47.73 3 -72.72	109.08 34.05 210.48 47.73 3 -72.72 66.03	109.08 36.3 226.11 47.73 3 -72.72		(67) (68) (69) (70) (71)
(67)m= 35.3 Appliances (68)m= 236.3 Cooking ga (69)m= 47.3 Pumps and (70)m= 3 Losses e.g. (71)m= -72. Water heat (72)m= 70.9	gains (calculated properties of the calculated ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 (Table 5 3 on (negat -72.72 Table 5) 64.43	a Appendix 219.64 ppendix 47.73 5a) 3 tive valu	L, equat 14.44 dix L, eq 203.02 L, equat 47.73 3 es) (Tab	12.19 uation L 187.4 ion L15 47.73 3 le 5) -72.72	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 3 -72.72	109.08 Iso see 17.12 3a), also 174.51), also se 47.73 3 -72.72	109.08 Table 5 22.98 See Ta 180.69 Ee Table 47.73 3 -72.72	109.08 29.18 ble 5 193.86 5 47.73 3 -72.72	109.08 34.05 210.48 47.73 3 -72.72 66.03	109.08 36.3 226.11 47.73 3 -72.72		(67) (68) (69) (70) (71)	
(67)m= 35.3 Appliances (68)m= 236. Cooking ga (69)m= 47.3 Pumps and (70)m= 3 Losses e.g. (71)m= -72. Water heat (72)m= 70.9	gains (calculated properties) gains (calculated properties) gains (calculated properties) gains (calculated properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (calculated prop	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 c (Table 5 3 on (negat -72.72 Table 5) 64.43	19.32 Appendix 219.64 oppendix 47.73 5a) 3 tive valu -72.72	L, equat 14.44 dix L, eq 203.02 L, equat 47.73 3 es) (Tab -72.72	12.19 uation L 187.4 ion L15 47.73 3 le 5) -72.72 49.9 (66)	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 3 -72.72 45.98 m + (67)m	109.08 lso see 17.12 3a), also 174.51), also se 47.73 3 -72.72 51.53	109.08 Table 5 22.98 See Ta 180.69 Ee Table 47.73 3 -72.72 53.85 + (69)m + (109.08 29.18 ble 5 193.86 47.73 3 -72.72 59.6 (70)m + (7	109.08 34.05 210.48 47.73 3 -72.72 66.03 1)m + (72)	109.08 36.3 226.11 47.73 3 -72.72 69.2		(67) (68) (69) (70) (71) (72)
(67)m= 35.3 Appliances (68)m= 236. Cooking ga (69)m= 47.3 Pumps and (70)m= 3 Losses e.g. (71)m= -72. Water heat (72)m= 70.9 Total interior (73)m= 429. 6. Solar ga	gains (calculated properties) gains (calculated properties) gains (calculated properties) gains (calculated properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (appeared properties) gains (calculated prop	ted in Ap 25.51 culated in 232.81 ated in Ap 47.73 c (Table 5 3 on (negat -72.72 Table 5) 64.43 culated in Ap 47.73 culated in	19.32 Appendix 219.64 oppendix 47.73 5a) 3 tive valu -72.72 58.85	L, equat 14.44 dix L, eq 203.02 L, equat 47.73 3 es) (Tab -72.72 55.04	12.19 uation L 187.4 ion L15 47.73 3 le 5) -72.72 49.9 (66) 336.57	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 3 -72.72 45.98 m + (67)m 323.2	109.08 Iso see 17.12 3a), also 174.51), also se 47.73 3 -72.72 51.53 1+(68)m+ 330.25	109.08 Table 5 22.98 See Ta 180.69 See Table 47.73 3 -72.72 53.85 + (69)m + (344.61	29.18 ble 5 193.86 5 47.73 3 -72.72 59.6 (70)m + (7369.73	109.08 34.05 210.48 47.73 3 -72.72 66.03 1)m + (72) 397.65	109.08 36.3 226.11 47.73 3 -72.72 69.2 m 418.7		(67) (68) (69) (70) (71) (72)

Table 6a

Table 6b

Table 6c

m²

Table 6d

(W)

		,						_ ,				_
Northeast _{0.9x}	0.77	X	7.15	X	11.28	X	0.24	x	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.97	X	0.24	X	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	X	7.15	X	41.38	X	0.24	X	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	X	7.15	X	67.96	X	0.24	x	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	X	7.15	X	91.35	X	0.24	х	0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	X	7.15	X	97.38	X	0.24	x	0.7	=	162.13	(75)
Northeast 0.9x	0.77	X	7.15	x	91.1	X	0.24	x	0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	X	7.15	x	72.63	X	0.24	x	0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	X	7.15	x	50.42	X	0.24	х	0.7	=	83.94	(75)
Northeast 0.9x	0.77	X	7.15	x	28.07	X	0.24	x	0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	X	7.15	x	14.2	x	0.24	x	0.7		23.64	(75)
Northeast _{0.9x}	0.77	X	7.15	x	9.21	x	0.24	x	0.7		15.34	(75)
Southwest _{0.9x}	0.77	X	2.19	x	36.79		0.24	x	0.7		9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.79		0.24	x	0.7		3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	x	62.67		0.24	x	0.7	=	15.98	(79)
Southwest _{0.9x}	0.77	X	0.75	x	62.67		0.24	x	0.7		5.47	(79)
Southwest _{0.9x}	0.77	X	2.19	x	85.75		0.24	x	0.7	=	21.86	(79)
Southwest _{0.9x}	0.77	X	0.75	x	85.75		0.24	x	0.7	=	7.49	(79)
Southwest _{0.9x}	0.77	x	2.19	x	106.25	İ	0.24	x	0.7	-	27.09	(79)
Southwest _{0.9x}	0.77	X	0.75	x	106.25	İ	0.24	x	0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	X	2.19	x	119.01	j i	0.24	x	0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	X	0.75	x	119.01	j i	0.24	_ x	0.7	=	10.39	(79)
Southwest _{0.9x}	0.77	X	2.19	x	118.15	İ	0.24	x	0.7	=	30.12	(79)
Southwest _{0.9x}	0.77	X	0.75	x	118.15		0.24	x	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	X	2.19	x	113.91	İ	0.24	x	0.7	<u> </u>	29.04	(79)
Southwest _{0.9x}	0.77	X	0.75	x	113.91		0.24	x	0.7	=	9.95	(79)
Southwest _{0.9x}	0.77	X	2.19	x	104.39		0.24	x	0.7		26.62	(79)
Southwest _{0.9x}	0.77	X	0.75	x	104.39		0.24	x	0.7	_	9.12	(79)
Southwest _{0.9x}	0.77	X	2.19	x	92.85		0.24	х	0.7	=	23.67	(79)
Southwest _{0.9x}	0.77	X	0.75	x	92.85		0.24	х	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	X	2.19	x	69.27		0.24	х	0.7	=	17.66	(79)
Southwest _{0.9x}	0.77	X	0.75	x	69.27		0.24	х	0.7	=	6.05	(79)
Southwest _{0.9x}	0.77	X	2.19	x	44.07		0.24	x	0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	X	0.75	x	44.07		0.24	х	0.7	=	3.85	(79)
Southwest _{0.9x}	0.77	X	2.19	x	31.49		0.24	х	0.7	=	8.03	(79)
Southwest _{0.9x}	0.77	X	0.75	x	31.49		0.24	x	0.7	=	2.75	(79)
Solar gains in v	vatts, calcul	ated		th		(83)m	s = Sum(74)m.	(82)m			1	
(83)m= 31.38		.24	149.51 192.8		02.57 190.66	156	.65 115.73	70.44	38.72	26.12]	(83)
Total gains – in			` 	`	· ·						1	(0.4)
(84)m= 461.31	485.81 508	3.08	534.4 552.4	. 5	39.15 513.86	486	.89 460.33	440.16	436.37	444.82]	(84)
7. Mean interr	nal temperat	ture (heating seaso	on)								
Temperature of	•	•		•		ole 9,	Th1 (°C)				21	(85)
Utilisation fact	<u>_</u>			m (s	ee Table 9a)				_		1	
Stroma ESAP 2012	2 VERBn. 1.d.	496 (s	SAP 9.52) - http://	Ww.	stroma.com/ul	A	ug Sep	Oct	Nov	Dec	Page	5 of 9

Mean internal temperature More															
19.5 19.62 19.87 20.23 20.58 20.85 20.95 20.94 20.74 20.31 19.85 19.48	(86)m=	0.99	0.99	0.98	0.96	0.91	0.79	0.64	0.68	0.87	0.97	0.99	0.99		(86)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (*C)	Mean	internal	temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
Series 18,67 19,67 19,67 19,68 19,68 19,68 19,68 19,7 19,7 19,7 19,69 19,68	(87)m=	19.5	19.62	19.87	20.23	20.58	20.85	20.95	20.94	20.74	20.31	19.85	19.48		(87)
Utilisation factor for gains for rest of dwelling, In.2,m (see Table 9a) (89)m (89) 0.99 0.99 0.97 0.94 0.86 0.68 0.47 0.53 0.8 0.95 0.98 0.99 (89) (89)	Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ıble 9, T	h2 (°C)					
Ces max Deep Dee	(88)m=	19.67	19.67	19.67	19.68	19.69	19.7	19.7	19.7	19.69	19.69	19.68	19.68		(88)
Ces max Deep Dee	Utilisa	ation fac	tor for a	ains for	rest of d	wellina.	h2.m (se	e Table	9a)						
Solution 17.74 17.91 18.27 18.79 19.27 19.59 19.68 19.67 19.48 18.92 18.25 17.71							`			0.8	0.95	0.98	0.99		(89)
Solution 17.74 17.91 18.27 18.79 19.27 19.59 19.68 19.67 19.48 18.92 18.25 17.71	Mean	internal	temner	ature in	the rest	of dwelli	na T2 (f	allow ste	ns 3 to	7 in Tahl	e 9c)			l	
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)me 18.18 18.34 18.67 19.15 19.6 19.91 20 19.99 19.8 19.27 18.65 18.15 (92)							- ` `					18.25	17.71		(90)
18.18 18.34 18.67 19.15 19.6 19.91 20 19.99 19.8 19.27 18.65 18.15 (92)	, ,									lf	LA = Livin	g area ÷ (4	4) =	0.25	(91)
18.18 18.34 18.67 19.15 19.6 19.91 20 19.99 19.8 19.27 18.65 18.15 (92)	Moon	intornal	tompor	oturo (fo	r tha wh	ala dwa	lling) – fl	Λ Τ1	. /1 fl	۸) T2					
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (33)ms 18.03 18.19 18.52 19 19.45 19.76 19.85 19.84 19.65 19.12 18.5 18 (33) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (34)ms 0.98 0.98 0.97 0.93 0.85 0.69 0.49 0.54 0.8 0.94 0.98 0.99 0.94 0.95 0.99 0.94 0.95 0.95 0.95 0.95 0.95 0.95 0.95 0.95			•	· `			~~		_`	- 	19 27	18.65	18 15		(92)
Same 18.03 18.19 18.52 19 19.45 19.76 19.85 19.84 19.65 19.12 18.5 18 (93)												10.00	10.10		(/
Set Ti to the mean intermal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a												18.5	18		(93)
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a. Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m 0.98 0.98 0.98 0.97 0.93 0.85 0.69 0.49 0.54 0.8 0.94 0.98 0.99 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m 454.05 175.64 190.97 198.43 471.4 371.99 254.18 265 365.97 1412.41 125.65 438.72 (95) Monthly average external temperature from Table 8 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.6 16.4 14.1 10.6 7.1 14.2 (96) Heat loss rate for mean internal temperature, m, W = (39)m x ([93)m - (96)m] (97)m 1136.02 1097.85 991.21 825.15 632 1416.84 262.56 277.47 450.28 694.48 933.39 1133.57 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m 507.38 118.12 372.18 235.24 119.48 0 0 0 0 0 209.86 365.57 516.97 Total per year (kWh/year) = Sum(98), .s.s., z = 2744.81 (98) Space heating requirement in kWh/m²/year Eaclulated for June, July and August. See Table 10b Sac. Space cooling requirement Calculated for June, July and August. See Table 10b Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m 0 0 0 0 0 0 0 0 0.86 0.76 0.72 0 0 0 0 0 0 (100) Utilisation factor for loss hm (101)m 0 0 0 0 0 0 0 5 513.49 456.79 444.35 0 0 0 0 0 0 (101) Space scooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m															. ,
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	•		•			re obtain	ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)m=								<u>'</u>			, ,	,		1	
(94)me		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm , W = (94)m x (84)m (95)m=	Utilisa	ation fac	tor for g	ains, hm	:		•		•					ı	
(95)me	(94)m=	0.98	0.98	0.97	0.93	0.85	0.69	0.49	0.54	0.8	0.94	0.98	0.99		(94)
Monthly average external temperature from Table 8 (96)m= 4.3	Usefu		hmGm	W = (94)	4)m x (84	4)m								ı	
(96)m=	(95)m=	454.05	475.64	490.97	498.43	471.4	371.99	254.18	265	365.97	412.41	425.65	438.72		(95)
Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) (97)m = 1136.02 (1097.85 (991.21 (825.15 (632 (416.84 (262.56 (277.47 (450.28 (694.48 (933.39 (1133.57 (97) (98)m = 1136.02 (1097.85 (991.21 (825.15 (632 (416.84 (262.56 (277.47 (450.28 (694.48 (933.39 (1133.57 (97) (98)m = 507.38 (418.12 (372.18 (235.24 (119.48 (0 0 0 0 0 209.86 (365.57 (516.97 (198)m = 507.38 (418.12 (372.18 (235.24 (119.48 (0 0 0 0 0 209.86 (365.57 (516.97 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (418.12 (198)m = 507.38 (19	Montl	nly avera	age exte	rnal tem	perature	from Ta	able 8							1	
(97)m= 1136.02 1097.85 991.21 825.15 632 416.84 262.56 277.47 450.28 694.48 933.39 1133.57 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 507.38 418.12 372.18 235.24 119.48 0 0 0 0 0 209.86 365.57 516.97 Total per year (kWh/year) = Sum(98)s2 = 2744.81 (98) Space heating requirement in kWh/m²/year 50.51 (99) 8c. Space cooling requirement Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 0 759.65 598.02 613.05 0 0 0 0 0 (100) Utilisation factor for loss hm (101)m= 0 0 0 0 0 0 0 513.49 456.79 444.35 0 0 0 0 0 (102) Gains (solar gains calculated for applicable weather region, see Table 10) (102)m= 0 0 0 0 0 0 0 570.35 543.05 510.34 0 0 0 0 0 (102) Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m (104)m= 0 0 0 0 0 0 0 0 64.18 49.1 0 0 0 0 0	(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m=	Heat	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			1	
(98)m= 507.38	(97)m=	1136.02	1097.85	991.21	825.15	632	416.84	262.56	277.47	450.28	694.48	933.39	1133.57		(97)
Space heating requirement in kWh/m²/year Sum(98) _{1.59-12} = 2744.81 (98)	Space	e heating	g require	ement fo	r each n	nonth, k\	/Vh/mon	h = 0.02	24 x [(97)m – (95		1)m		ı	
Space heating requirement in kWh/m²/year S0.51 (99)	(98)m=	507.38	418.12	372.18	235.24	119.48	0	0	0	0	209.86	365.57	516.97		
Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec									Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	2744.81	(98)
	Space	e heating	g require	ement in	kWh/m²	?/year								50.51	(99)
	8c. S	pace cod	olina rec	uiremen	nt										
			- J	•		See Tal	ole 10b								
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 0 759.65 598.02 613.05 0 0 0 0 0 (100) Utilisation factor for loss hm (101)m= 0 0 0 0 0 0 0.68 0.76 0.72 0 0 0 0 0 (101) Useful loss, hmLm (Watts) = (100) m x (101) m (102)m= 0 0 0 0 0 513.49 456.79 444.35 0 0 0 0 0 (102) Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= 0 0 0 0 0 570.35 543.05 510.34 0 0 0 0 0 (103) Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103) m - (102) m] x (41) m set (104) m to zero if (104) m < 3 x (98) m (104)m= 0 0 0 0 0 64.18 49.1 0 0 0 0	00.00							Jul	Aug	Sep	Oct	Nov	Dec		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Heat	loss rate	Lm (ca	lculated				perature			nperatur	e from T	able 10)		
	(100)m=	0	0	0	0	0	759.65	598.02	613.05	0	0	0	0		(100)
Useful loss, hmLm (Watts) = (100) m x (101) m (102)m= 0 0 0 0 0 513.49 456.79 444.35 0 0 0 0 0 (102) Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= 0 0 0 0 0 570.35 543.05 510.34 0 0 0 0 0 (103) Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103) m - (102) m] x (41) m set (104) m to zero if (104) m < 3 x (98) m (104)m= 0 0 0 0 0 64.18 49.1 0 0 0 0	Utilisa	ation fac	tor for lo	ss hm						!					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(101)m=	0	0	0	0	0	0.68	0.76	0.72	0	0	0	0		(101)
Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Usefu	ıl loss, h	mLm (V	/atts) = ((100)m x	(101)m								l	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(102)m=	0	0	0	0	0	513.49	456.79	444.35	0	0	0	0		(102)
Space cooling requirement for month, whole dwelling, continuous (kWh) = $0.024 \times [(103)m - (102)m] \times (41)m$ set (104)m to zero if (104)m < $3 \times (98)m$ (104)m= 0 0 0 0 0 64.18 49.1 0 0 0	Gains	s (solar g	ains ca	lculated	for appli	cable we	eather re	gion, se	e Table	10)				l.	
set (104)m to zero if (104)m < 3 × (98)m (104)m= 0 0 0 0 0 64.18 49.1 0 0 0	(103)m=	0	0	0	0	0	570.35	543.05	510.34	0	0	0	0		(103)
(104)m= 0 0 0 0 0 0 64.18 49.1 0 0 0	•						lwelling,	continu	ous (kW	h = 0.0	24 x [(10)3)m – (102)m] x	x (41)m	
	,			<u> </u>										l	
Total = Sum(104) = 113.27 (104)	(104)m=	0	0	0	0	0	0	64.18	49.1				0		_
										Total	= Sum(104)	=	113.27	(104)

Intermittency factor (Table 10b)	Cooled fraction							f C =	cooled	area ∸ (4	1) = [0.7	(105)
Total = Sum(104) = 0 0 0 0 0 0 0 0 0		Table 10b)					10-	oooloa	arca . (-	''	0.1	(,
Space cooling requirement for month = (104)m x (105) x (106)m 107)m	<u> </u>	1	Í	0	0.25	0.25	0.25	0	0	0	0		
Total = Sum(107) = 19.8 11.22 19.8 11.22 19.8 10.7 (107) = 19.8 11.22 19.8 11.22 19.8 11.22 19.8 11.23 19.8	<u>'</u>					ı		Tota	l = Sum(104)	=	0	(106)
Total = Sum(107) = 19.8 (107)	Space cooling require	ement for	month =	(104)m	× (105)	× (106)r	n						_
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.38 (17) 3a. Energy requirements — Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × (1 - (203)) = 1 (202) Efficiency of main space heating system 1 (204) = (202) × (1 - (203)) = 1 (202) Efficiency of secondary/supplementary heating system, % 0 (202) Cooling System Energy Efficiency Ratio 4.73 (202) Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 0 209.86 365.57 516.97 (211)m = {{(98)m x (204)}} }	(107)m = 0 0	0	0	0	0	11.22	8.58	0	0	0	0		
Saze heating Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from main system Saze heat from main system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary system Saze heat from secondary/supplementary heating system, % Saze heat from secondary/supplementary heat from system Saze heat from secondary/supplementary heat from system Saze heat from secondary/supplementary system Saze heat from secondary system Saze heat from secondary system								Total	= Sum(107)	= [19.8	(107)
Space heating: Fraction of space heat from secondary/supplementary system C202] = 1 - (201) = 1 (20) (202) = 1 - (201) = 1 (20) (202) = 1 - (201) = 1 (20) (202) = 1 - (201) = 1 (202) = 1 - (203) (202) (Space cooling require	ement in k	دWh/m²/y	/ear				(107)) ÷ (4) =			0.36	(108)
Fraction of space heat from secondary/supplementary system Fraction of space heat from main system (s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Cooling System Energy Efficiency Ratio Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 29.86 365.57 516.97 (211)m = {[[(98)m x (204)]] } x 100 ÷ (206) 566.91 467.18 415.84 262.84 133.5 0 0 0 0 234.48 408.46 577.62 Space heating fuel (secondary), kWh/month = {[[(98)m x (201)]] } x 100 ÷ (208) (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9a. Energy requirement	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Cooling System Energy Efficiency Ratio Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 0 293.86 365.57 516.97 (211)m = {[(98)m x (204)]} x 100 ÷ (206) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208) C15)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•										г		_
Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (•			. , ,	mentary	-					Ţ	0	(201)
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Cooling System Energy Efficiency Ratio Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 0 299.86 365.57 516.97 (211)m = {[(98)m x (204)]} x 100 ÷ (206) 566.91 467.18 415.84 262.84 133.5 0 0 0 0 234.48 408.46 577.62 Total (kWh/year) =Sum(211)_L.s.ur.r.r. 3066.82 (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Fraction of space he	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Efficiency of secondary/supplementary heating system, % Cooling System Energy Efficiency Ratio Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 0 209.86 365.57 516.97 (211)m = {[(98)m × (204)]}	Fraction of total hea	ting from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Cooling System Energy Efficiency Ratio Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 507.38 418.12 372.18 235.24 119.48 0 0 0 0 209.86 365.57 516.97 (211)m = {[(98)m x (204)] } x 100 ÷ (206) Total (kWh/year) = Sum(211)_1stetr = 3066.82 (215)_m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Efficiency of main sp	ace heat	ing syste	em 1								89.5	(206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Efficiency of second	ary/suppl	ementar	y heating	g system	າ, %					Ī	0	(208)
Space heating requirement (calculated above) 507.38	Cooling System End	rgy Effici	ency Ra	tio							Ī	4.73	(209)
Space heating requirement (calculated above) 507.38	Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊸ ear
(211)m = {[(98)m x (204)] } x 100 ÷ (206)												.,	
Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating fuel (secondary), kWh/month Space heating Space heatin	507.38 418.12	372.18	235.24	119.48	0	0	0	0	209.86	365.57	516.97		
Space heating fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/month Space fuel (secondary), kWh/mont	(211) m = { $[(98)$ m x (2	04)] } x 1	00 ÷ (20	06)									(211)
Space heating fuel (secondary), kWh/month = {[[98]m x (201)]} x 100 ÷ (208) (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	· · · · · · · · · · · · · · · · · · ·				0	0	0	0	234.48	408.46	577.62		
= {[(98)m x (201)] } x 100 ÷ (208) (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					Į	ļ.	Tota	l (kWh/yea	ar) =Sum(2	211),5,1012	=	3066.82	(211)
(215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Space heating fuel (secondar	y), kWh/	month									_
Total (kWh/year) =Sum(215) _{15,1012} 0 Water heating Output from water heater (calculated above) 169.6 148.15 154.14 136.71 132.36 116.58 111.69 124.51 125.88 143.34 153.02 165.61 Efficiency of water heater 89.5 </td <td>$= \{[(98)m \times (201)]\} x$</td> <td>100 ÷ (20</td> <td>8)</td> <td></td> <td>-</td> <td>_</td> <td></td> <td></td> <td>_</td> <td>_</td> <td></td> <td></td> <td></td>	$= \{[(98)m \times (201)]\} x$	100 ÷ (20	8)		-	_			_	_			
Water heating Output from water heater (calculated above) 169.6	(215)m = 0 0	0	0	0	0	0							
Output from water heater (calculated above) 169.6							Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	-	0	(215)
169.6 148.15 154.14 136.71 132.36 116.58 111.69 124.51 125.88 143.34 153.02 165.61 Efficiency of water heater (217)m= 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5	Water heating												
Efficiency of water heater	·	1 '			440.50	1 444 00	404.54	405.00	440.04	450.00	405.04		
(217)m= 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 89.5 Fuel for water heating, kWh/month (219)m = (64) m x $100 \div (217)$ m (219)m= 189.49 165.53 172.22 152.75 147.89 130.25 124.79 139.11 140.65 160.16 170.97 185.04 Total = Sum(219a) ₁₁₂ = 1878.87 (218) Space cooling fuel, kWh/month.			136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		7(040)
Fuel for water heating, kWh/month (219)m = (64) m x $100 \div (217)$ m (219)m = 189.49 165.53 172.22 152.75 147.89 130.25 124.79 139.11 140.65 160.16 170.97 185.04 Total = Sum(219a) ₁₁₂ = 1878.87 (21) Space cooling fuel, kWh/month.		1		20.5			00.5	00.5	00.5	00.5	00.5	89.5	
$ (219) \text{m} = (64) \text{m} \times 100 \div (217) \text{m} $ $ (219) \text{m} = 189.49 165.53 172.22 152.75 147.89 130.25 124.79 139.11 140.65 160.16 170.97 185.04 $	` '			89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(217)
(219)m= 189.49 165.53 172.22 152.75 147.89 130.25 124.79 139.11 140.65 160.16 170.97 185.04 Total = Sum(219a) ₁₁₂ = 1878.87 (219a)	•	•											
Space cooling fuel, kWh/month.	` '			147.89	130.25	124.79	139.11	140.65	160.16	170.97	185.04		
		•	•			•	Tota	I = Sum(2	19a) ₁₁₂ =			1878.87	(219)
$(221)m = (107)m \div (209)$	Space cooling fuel,	kWh/moı	nth.								L		
	·	09)	,		·	1		1	г	T			
(221)m= 0 0 0 0 0 0 2.37 1.82 0 0 0 0	(221)m = 0 0	0	0	0	0	2.37	<u> </u>	<u> </u>	<u> </u>	0	0		_
Total = $Sum(221)_{68}$ = 4.19							Tota	I = Sum(2	21) ₆₈ =			4.19	(221)
Annual totals kWh/year kWh/year kWh/year									k\	Wh/year		kWh/yea	<u>r_</u>
Space heating fuel used, main system 1 3066.82	Space heating fuel us	ed, main	system	1							L	3066.82	
Water heating fuel used 1878.87	Water heating fuel us	ed										1878.87	
Space cooling fuel used 4.19											_		

Electricity for pumps, fans and electric keep-h	ot		
mechanical ventilation - balanced, extract or	positive input from outside	e 90.	49 (230a)
central heating pump:		30	(230c)
Total electricity for the above, kWh/year	sum	of (230a)(230g) =	120.49 (231)
Electricity for lighting			249.52 (232)
10a. Fuel costs - individual heating systems:			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	3.48 x 0.0°	1 = 106.73 (240)
Space heating - main system 2	(213) x	0 x 0.0	1 = 0 (241)
Space heating - secondary	(215) x	13.19 x 0.0°	1 = 0 (242)
Water heating cost (other fuel)	(219)	3.48 x 0.0°	1 = 65.38 (247)
Space cooling	(221)	13.19 x 0.0°	1 = 0.55 (248)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.0°	1 = 15.89 (249)
(if off-peak tariff, list each of (230a) to (230g) s Energy for lighting	separately as applicable a	nd apply fuel price according 13.19 × 0.0	
Additional standing charges (Table 12)			120 (251)
Appendix Q items: repeat lines (253) and (254). Total energy cost (245).	4) as needed (247) + (250)(254) =		341.47 (255)
11a. SAP rating - individual heating systems			
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF) [(255)	x (256)] ÷ [(4) + 45.0] =		1.44 (257)
SAP rating (Section 12)			79.86 (258)
12a. CO2 emissions – Individual heating sys	tems including micro-CHF		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	662.43 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	405.84 (264)
Space and water heating	(261) + (262) + (263) + ((264) =	1068.27 (265)
Space cooling	(221) x	0.519	2.18 (266)
Electricity for pumps, fans and electric keep-h	ot (231) x	0.519	62.54 (267)
Electricity for lighting	(232) x	0.519 =	129.5 (268)
Total CO2, kg/year		sum of (265)(271) =	1262.48 (272)
CO2 emissions per m ²		(272) ÷ (4) =	23.23 (273)
El rating (section 14)			83 (274)

13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3741.52 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2292.22 (264)
Space and water heating	(261) + (262) + (263) + (264) =		6033.74 (265)
Space cooling	(221) x	3.07	12.87 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	369.91 (267)
Electricity for lighting	(232) x	0 =	766.03 (268)
'Total Primary Energy	sum	n of (265)(271) =	7182.55 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	132.18 (273)

		1	User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa	re Ver	sion:			016363 on: 1.0.4.10	
Address		Pro	perty A	Address:	Flat 4-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:									
1. Overall aweiling all ne	moiorie.		Area	a(m²)		Av. He	ight(m)		Volume(m³)	
Basement				<u> </u>	(1a) x		2.6	(2a) =	144.59	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	5	5.61	(4)			•		_
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	144.59	(5)
2. Ventilation rate:										
		econdary leating		other		total			m³ per houi	•
Number of chimneys	0 +	0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ans					0	x ′	10 =	0	(7a)
Number of passive vents	S				Ē	0	x '	10 =	0	(7b)
Number of flueless gas f	ires				Ē	0	x	40 =	0	[7c)
					<u></u>				_	_
					_		<u>_</u>	Air ch	nanges per ho	ur —
Infiltration due to chimne If a pressurisation test has be	•				ontinuo fr	0 om (0) to (÷ (5) =	0	(8)
Number of storeys in t		ва, ргосева в	10 (17), C	JUTET WISE C	Onunue m	om (9) 10 (10)		0	(9)
Additional infiltration	3 ()						[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber	frame or 0	.35 for	masonr	y constr	uction			0	(11)
	resent, use the value corres	ponding to th	he greate	er wall area	a (after			,		
deducting areas of openi If suspended wooden	• / .	ed) or 0.1	(seale	d) else	enter 0				0	(12)
If no draught lobby, en	•	04) 01 0.1	(ooalo	,a), 0.00°	011101 0				0	(13)
Percentage of window		ripped							0	(14)
Window infiltration	5	• •		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cub	ic metres	per ho	ur per so	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabi	lity value, then (18) = [(1	7) ÷ 20]+(8),	otherwi	se (18) = (16)				0.15	(18)
Air permeability value applie	•	s been done	or a deg	gree air pei	meability	is being us	sed			_
Number of sides sheltere Shelter factor	ed			(20) = 1 - [0 075 v (1	Q)1 —			3	(19)
Infiltration rate incorpora	ting shalter factor			(20) = 1 - [$(21) = (18)$		J)] –			0.78	(20)
Infiltration rate modified	-	ı		(21) = (10)	X (20) =				0.12	(21)
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		J Juli	Jui	Aug	ОСР	001	1404	Dec		
(22) m= $\begin{bmatrix} 5.1 \\ 5 \end{bmatrix}$	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
· -/···	- 1		0		•	L	L	I		
Wind Factor (22a)m = (2	'	г г							Ī	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

0.15	ation rate	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effe		-	rate for t	he appli	cable ca	se	ļ		<u>!</u>	<u>!</u>			
If mechanic												0.5	(2
If exhaust air h) = (23a)			0.5	(2
If balanced with	n heat reco	very: effici	ency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				76.5	(2
a) If balance				1		- ` ` 	- 	í `	- ^ `) ÷ 100]	
24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(2
b) If balance	1		ı	1		<u> </u>	É È	``	- ` `	- 	1	7	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
c) If whole h	nouse ext			•	•				.5 × (23b	o)		_	
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r	ventilation $n = 1$, the				•				0.5]			_	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)					
25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
3. Heat losse	s and he	at loss p	paramete	er:									
LEMENT	Gros area	-	Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-valu kJ/m²·		A X k kJ/K
Ooors					2.6	X	1.2		3.12				(2
Vindows Type	e 1				7.15	x1.	/[1/(1.2)+	0.04] =	8.19				(2
Vindows Type	∍ 2				2.19	x1	/[1/(1.2)+	0.04] =	2.51				(2
Vindows Type	∍ 3				0.75	x1	/[1/(1.2)+	0.04] =	0.86				(2
Valls Type1	34.6	6	17.24	4	17.42	2 x	0.15		2.61				(2
			17.2		17.42		0.10	-					
• •	23.9	2	2.6		21.32	2 X		=	3.2	F i			(2
Valls Type2	23.9					_		=					=
Valls Type2 Valls Type3		3	2.6		21.32	x	0.15	=	3.2				(2
Valls Type2 Valls Type3 Valls Type4 Roof	2.63	3	2.6		21.32	x x x	0.15	=	3.2 0.39				(2)
Valls Type3 Valls Type4 Roof	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13	x 3 x 1 x	0.15 0.15 0.15	= = =	3.2 0.39 3.77				(2
Valls Type2 Valls Type3 Valls Type4	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13 55.6	x 3 x 1 x	0.15 0.15 0.15	= = =	3.2 0.39 3.77				(2
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13 55.6 ² 141.9	x x 33 x x 11 x x 55 x	0.15 0.15 0.15 0.15	=	3.2 0.39 3.77 8.34				(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of earty wall Party floor for windows and	2.63 25.1: 55.6 elements,	3 3 3 51 , m ²	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x x 3 x 1 x x 5 x x 1	0.15 0.15 0.15 0.15	= = = = = = = = = = = = = = = = = = = =	3.2 0.39 3.77 8.34	as given ir	n paragrapa	h 3.2	(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and * include the area	2.63 25.1: 55.6 elements,	3 3 3 in the state of the state	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15	= = = =	3.2 0.39 3.77 8.34	as given ir	n paragrap	h 3.2	(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e	2.63 25.1: 55.6 elements, d roof windo	3 3 3 3 3 3 3 51 , m² cows, use e sides of in = S (A x	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15 0.17	= = = = 	3.2 0.39 3.77 8.34				(3) (3) (3) (3)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and * include the area Tabric heat los	2.63 25.11 55.6 elements, d roof windown ss, W/K = Cm = S(A)	3 3 3 3 in m ² ows, use ender sides of interest (A x k)	2.6 0 0 0	ls and pan	21.32 2.63 25.13 55.67 141.9 7.81 55.67 alue calculatitions	x 3 x 1 x 15 x 1 lated using	0.15 0.15 0.15 0.15 0.17	= = = = 	3.2 0.39 3.77 8.34 0	2) + (32a)		41.18	
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and the include the area Tabric heat loss Heat capacity	2.63 25.1: 55.6 belements, d roof windown as on both ss, W/K = Cm = S(A) s parameter sments who	3 3 3 3 3 3 3 51 , m² ows, use e sides of in e S (A x K) ter (TMF) ere the decided	2.6 0 0 0 offective with ternal walk U) $P = Cm \div tails of the$	ls and pan	21.32 2.63 25.13 55.6 ² 141.9 7.81 55.6 ³ alue calculatitions	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15 0.16 0.17 0.17 0.18 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19	= = = = 	3.2 0.39 3.77 8.34 0 0 (30) + (32) ative Value	2) + (32a) : Medium	(32e) =	41.18	(2)

												_
Total fabric heat los							. ,	(36) =			69.75	(37)
Ventilation heat los		· ·	í	T	T	<u> </u>			25)m x (5)		1	
Jan Fo	+	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m= 12.68 12.	54 12.4	11.71	11.57	10.88	10.88	10.74	11.15	11.57	11.85	12.12		(38)
Heat transfer coeffi		•	.			•	· · ·	= (37) + (3			I	
(39)m= 82.42 82.	28 82.15	81.45	81.31	80.62	80.62	80.48	80.9	81.31	81.59	81.87		7 (20)
Heat loss paramete	er (HLP). W	/m²K						4verage = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	81.42	(39)
(40)m= 1.48 1.4	``	1.46	1.46	1.45	1.45	1.45	1.45	1.46	1.47	1.47		
		!	!	<u> </u>	<u> </u>		,	Average =	Sum(40) ₁ .	12 /12=	1.46	(40)
Number of days in	month (Tab	le 1a)									İ	
Jan Fe	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heating 6	energy requ	irement:								kWh/ye	ear:	
Assumed occupan	cy, N								1.	86		(42)
if TFA > 13.9, N		([1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.				` '
if TFA £ 13.9, N : Annual average ho		aa in litra	se nar da	y Vd av	orano –	(25 v NI)	⊥ 36		70	00	[(43)
Reduce the annual ave								se target o		.26		(43)
not more that 125 litres	per person pe	r day (all и	vater use, i	hot and co	ld)							
Jan F		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres	per day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m= 86.09 82.	96 79.83	76.7	73.57	70.44	70.44	73.57	76.7	79.83	82.96	86.09		٦
Energy content of hot w	ater used - ca	lculated m	onthly $= 4$.	190 x Vd,r	n x nm x [OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		939.13	(44)
(45)m= 127.67 111	66 115.22	100.45	96.39	83.17	77.07	88.44	89.5	104.3	113.85	123.64		
` /		ļ	<u>!</u>	<u> </u>	<u> </u>	<u> </u>		Γotal = Su	<u>l</u> m(45) ₁₁₂ =		1231.35	(45)
If instantaneous water h	eating at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46)) to (61)					
(46)m= 19.15 16.	ı	15.07	14.46	12.48	11.56	13.27	13.42	15.65	17.08	18.55		(46)
Water storage loss		20 001 0	olor or M	WHDC	otorogo	within or	ma vaa	o o l			1	(47)
Storage volume (lit	,	•			_		ame ves	sei		0		(47)
If community heating Otherwise if no sto	•		-			` '	ers) ente	er 'O' in <i>(</i>	47)			
Water storage loss		(,		,			
a) If manufacturer'	s declared	loss fact	or is kno	wn (kWł	n/day):					0		(48)
Temperature factor	from Table	2b								0		(49)
Energy lost from wa	_	-				(48) x (49)) =			0		(50)
b) If manufacturer'Hot water storage I		-										(54)
If community heating			ie z (KVV	II/IIII C /Uc	iy <i>)</i>					0		(51)
Volume factor from	-									0		(52)
Temperature factor	from Table	2b								0		(53)
Energy lost from wa	ater storage	e, kWh/y	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) i	n (55)									0		(55)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor f	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 43.87	38.18	40.68	37.82	37.49	34.74	35.89	37.49	37.82	40.68	40.91	43.87		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 171.53	149.84	155.9	138.27	133.87	117.91	112.97	125.93	127.32	144.98	154.76	167.51		(62)
Solar DHW input	calculated	using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)		ī	i	•	
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			•	•	•					•	
(64)m= 171.53	149.84	155.9	138.27	133.87	117.91	112.97	125.93	127.32	144.98	154.76	167.51		1
							Outp	out from wa	ater heate	r (annual)₁	12	1700.79	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 53.42	46.67	48.48	42.86	41.42	36.34	34.6	I 00 70	0004	4405				(CE)
		10.10	42.00	41.42	30.34	34.6	38.78	39.21	44.85	48.08	52.08		(65)
include (57)	m in cal				l .	<u> </u>	<u> </u>					eating	(65)
include (57) 5. Internal g		culation o	of (65)m	only if c	l .	<u> </u>	<u> </u>					eating	(65)
, ,	ains (see	culation of Table 5	of (65)m and 5a	only if c	l .	<u> </u>	<u> </u>					eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	l .	<u> </u>	<u> </u>					eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a)	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	eating	(66)
5. Internal games Metabolic gair Jan	rs (Table Feb	culation of Table 5 (Section 1) Wat Mar	of (65)m 5 and 5a ts Apr 111.31	only if constant of the consta	ylinder is Jun 111.31	Jul	Aug	or hot w Sep 111.31	ater is fr	om com	munity h	eating	
5. Internal games See Metabolic gair Jan (66)m= 111.31	rs (Table Feb	culation of Table 5 (Section 1) Wat Mar	of (65)m 5 and 5a ts Apr 111.31	only if constant of the consta	ylinder is Jun 111.31	Jul	Aug	or hot w Sep 111.31	ater is fr	om com	munity h	eating	
5. Internal games Metabolic gain Jan (66)m= 111.31 Lighting gains	res (Table Feb 111.31 (calcula 32.02	E Table 5 E 5), Wat Mar 111.31 ted in Ap	of (65)m 6 and 5a tts Apr 111.31 opendix 19.71	May 111.31 L, equati	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
5. Internal games Metabolic gain Jan (66)m= 111.31 Lighting gains (67)m= 36.05	res (Table Feb 111.31 (calcula 32.02	E Table 5 E 5), Wat Mar 111.31 ted in Ap	of (65)m 6 and 5a tts Apr 111.31 opendix 19.71	May 111.31 L, equati	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
5. Internal games Metabolic gain Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances games	res (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93	culation of Table 5 (a) Wat Mar 111.31 ted in Ap 26.04 culated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	only if c May 111.31 L, equati 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Ta	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
5. Internal games Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances games (68)m= 241.43	res (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93	culation of Table 5 (a) Wat Mar 111.31 ted in Ap 26.04 culated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	only if c May 111.31 L, equati 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Ta	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
5. Internal games Metabolic gain Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances games (68)m= 241.43 Cooking gains	res (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93 (calcula 47.99	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62 ated in A 47.99	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equati 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99	res (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93 (calcula 47.99	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62 ated in A 47.99	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equati 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
5. Internal graph Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 res gains 3	culation of the culation of th	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 3	only if controls: May 111.31 L, equati 14.74 dix L, equati 207.21 L, equati 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
5. Internal given by the second of the secon	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 res gains 3	culation of the culation of th	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 3	only if controls: May 111.31 L, equati 14.74 dix L, equati 207.21 L, equati 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 3 Losses e.g. ev	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 ins gains 3 raporatio -74.21	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 3 tive value	only if construction only if construction only if construction on the construction of the construction on the construction of	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 3	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77 47.99	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -74.21	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 ins gains 3 raporatio -74.21	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 3 tive value	only if construction only if construction only if construction on the construction of the construction on the construction of the construction on the construction of the construction on the construction of	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 3	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77 47.99	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -74.21 Water heating	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 res gains 74.21 gains (Table Feb 111.31 (calcula 12.02 ins (calcula 12.03 (calcula 12.03 (calcula 12.03 (calcula 13	culation of the Eulation of th	of (65)m ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 3 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 3 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99 3	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99 3	Oct 111.31 29.78 ble 5 197.86 5 47.99 3 -74.21	Nov 111.31 34.76 214.83 47.99 3	Dec 111.31 37.05 230.77 47.99 3	eating	(66) (67) (68) (69) (70) (71)
Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -74.21 Water heating (72)m= 71.8	res (Table Feb 111.31 (calcula 32.02 ins (calcula 47.99 res gains 74.21 gains (Table Feb 111.31 (calcula 12.02 ins (calcula 12.03 (calcula 12.03 (calcula 12.03 (calcula 13	culation of the Eulation of th	of (65)m ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 3 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 3 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99 3	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99 3	Oct 111.31 29.78 ble 5 197.86 5 47.99 3 -74.21	Nov 111.31 34.76 214.83 47.99 3	Dec 111.31 37.05 230.77 47.99 3	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b	-	FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	7.15	x	11.28	x	0.24	x [0.7	=	18.78	(75)
Northeast 0.9x 0.77	X	7.15	x	22.97	x	0.24	x [0.7	=	38.24	(75)
Northeast 0.9x 0.77	x	7.15	x	41.38	x	0.24	x [0.7	=	68.89	(75)
Northeast 0.9x 0.77	X	7.15	x	67.96	x	0.24	x [0.7	=	113.14	(75)
Northeast 0.9x 0.77	X	7.15	x	91.35	x	0.24	x	0.7	=	152.08	(75)
Northeast 0.9x 0.77	x	7.15	x	97.38	x	0.24	x [0.7	=	162.13	(75)
Northeast 0.9x 0.77	X	7.15	x	91.1	x	0.24	x [0.7	=	151.67	(75)
Northeast 0.9x 0.77	X	7.15	x	72.63	x	0.24	x	0.7	=	120.91	(75)
Northeast 0.9x 0.77	x	7.15	x	50.42	x	0.24	x	0.7	=	83.94	(75)
Northeast 0.9x 0.77	x	7.15	x	28.07	x	0.24	x	0.7	=	46.73	(75)
Northeast 0.9x 0.77	x	7.15	x	14.2	x	0.24	x	0.7	=	23.64	(75)
Northeast 0.9x 0.77	x	7.15	x	9.21	x	0.24	×	0.7	=	15.34	(75)
Southwest _{0.9x} 0.77	x	2.19	x	36.79	ĺ	0.24	×	0.7	=	9.38	(79)
Southwest _{0.9x} 0.77	x	0.75	x	36.79	j	0.24	_ x [0.7	=	3.21	(79)
Southwest _{0.9x} 0.77	x	2.19	x	62.67	j	0.24	_ x [0.7	=	15.98	(79)
Southwest _{0.9x} 0.77	x	0.75	x	62.67	j	0.24	×	0.7	=	5.47	(79)
Southwest _{0.9x} 0.77	x	2.19	x	85.75	j	0.24	×	0.7	=	21.86	(79)
Southwest _{0.9x} 0.77	x	0.75	x	85.75	j	0.24	_ x [0.7	=	7.49	(79)
Southwest _{0.9x} 0.77	x	2.19	x	106.25	j	0.24	x	0.7	=	27.09	(79)
Southwest _{0.9x} 0.77	x	0.75	x	106.25	ĺ	0.24		0.7		9.28	(79)
Southwest _{0.9x} 0.77	X	2.19	х	119.01	İ	0.24		0.7	=	30.34	(79)
Southwest _{0.9x} 0.77	X	0.75	x	119.01	j	0.24	= x	0.7	= =	10.39	(79)
Southwest _{0.9x} 0.77	X	2.19	x	118.15	İ	0.24	x	0.7	=	30.12	(79)
Southwest _{0.9x} 0.77	X	0.75	x	118.15	j	0.24	= x [0.7	=	10.32	(79)
Southwest _{0.9x} 0.77	x	2.19	x	113.91	j	0.24		0.7	_ =	29.04	(79)
Southwest _{0.9x} 0.77	x	0.75	x	113.91	j	0.24		0.7		9.95	(79)
Southwest _{0.9x} 0.77	x	2.19	x	104.39	j	0.24		0.7	_ =	26.62	(79)
Southwest _{0.9x} 0.77	x	0.75	x	104.39	İ	0.24	= x [0.7	=	9.12	(79)
Southwest _{0.9x} 0.77	X	2.19	x	92.85	İ	0.24		0.7		23.67	(79)
Southwest _{0.9x} 0.77	X	0.75	х	92.85	İ	0.24		0.7	=	8.11	(79)
Southwest _{0.9x} 0.77	X	2.19	х	69.27	j	0.24	x	0.7	=	17.66	(79)
Southwest _{0.9x} 0.77	X	0.75	х	69.27	j	0.24		0.7	=	6.05	(79)
Southwest _{0.9x} 0.77	X	2.19	х	44.07	j	0.24		0.7	=	11.24	(79)
Southwest _{0.9x} 0.77	X	0.75	X	44.07	j	0.24	= x	0.7	=	3.85	(79)
Southwest _{0.9x} 0.77	X	2.19	ı X	31.49	ĺ	0.24	-	0.7	_	8.03	(79)
Southwest _{0.9x} 0.77) x	0.75	X	31.49	<u>.</u>]	0.24	x [0.7		2.75	(79)
	J		l		1						` ′
Solar gains in watts, calcul	ated	for each mon	th		(83)m	n = Sum(74)m .	(82)m				
(83)m= 31.38 59.69 98.	_	149.51 192.8	$\overline{}$	02.57 190.66	156	- 1	70.44	38.72	26.12		(83)
Total gains – internal and s	olar	(84)m = (73) n	า + (83)m , watts							
(84)m= 468.74 493.18 515	5.15	541.01 558.5	3 5	44.84 519.32	492	.44 466.16	446.45	443.18	452.03		(84)

7. Me	ean inter	nal temp	perature	(heating	season)								
Temp	erature	during h	neating p	eriods ir	n the livii	ng area	from Tab	ole 9, Th	1 (°C)				21	(85)
		ŭ	٠.		ea, h1,m	•		,	(- /					` ′
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98	0.96	0.91	0.78	0.63	0.68	0.87	0.97	0.99	0.99		(86)
Mear	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.55	19.67	19.91	20.26	20.6	20.86	20.96	20.94	20.76	20.34	19.89	19.52		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.99	0.99	0.98	0.94	0.86	0.68	0.47	0.52	0.8	0.95	0.98	0.99		(89)
Mear	n interna	l temper	ature in	the rest	of dwelli	ing T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)				
(90)m=	17.82	17.99	18.35	18.85	19.32	19.63	19.71	19.7	19.53	18.97	18.32	17.79		(90)
		-		-		-	-	-	1	fLA = Livin	ig area ÷ (4) =	0.26	(91)
Mear	n interna	l temper	ature (fo	or the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2			•		
(92)m=	18.26	18.42	18.75	19.21	19.65	19.94	20.03	20.02	19.84	19.32	18.72	18.23		(92)
Apply	/ adjustr	nent to t	he mear	interna	l temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.11	18.27	18.6	19.06	19.5	19.79	19.88	19.87	19.69	19.17	18.57	18.08		(93)
8. Sp	ace hea	ting requ	uirement											
				•		ned at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u		i e	or gains			l .	l	l .		l .	l			
Lier.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		<u>_</u>	ains, hm	1	0.05	0.60	0.40	0.54	0.70	I 0.04	1 0 00	0.00		(94)
(94)m=	0.98	0.98	0.97	0.93	0.85	0.69	0.49	0.54	0.79	0.94	0.98	0.99		(94)
		483.12	, W = (94 498.16	4)m x (8- 505.04	4)m 476.92	375.62	256.54	267.58	370.47	418.58	432.52	446.02		(95)
(95)m=							230.34	207.30	370.47	410.50	432.32	446.02		(93)
(96)m=		4.9	6.5	8.9	from Ta	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
					l erature,		<u> </u>	<u> </u>				7.2		(00)
	1138.64		993.62	827.54	634.03	418.75	264.44	279.39	452.37	697.01	936.25	1136.57		(97)
		<u> </u>			nonth, k\	Mh/mon	th = 0.02		ı)m – (95		1)m			
(98)m=	503.74		368.62	232.2	116.89	0	0	0	0	207.15	362.68	513.77		
			!	!	!	!	<u> </u>	Tota	l per year	(kWh/yea	r) = Sum(9	8) _{15,912} =	2719.88	(98)
Spac	e heatin	g require	ement in	kWh/m²	²/year								48.91	(99)
8c S	pace co	olina rec	quiremer	nt	•									
		Ĭ			See Tal	ble 10b								
Outo	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat		l		<u> </u>			l		<u> </u>	l		able 10)		
(100)m=		0	0	0	0	757.83	596.59	611.66	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm		•	•					•			
(101)m=	0	0	0	0	0	0.68	0.77	0.73	0	0	0	0		(101)

The filter backs	() () () ()	(400)	(404)									
Useful loss, hmLn (102)m= 0	$\frac{(\text{vvatts}) = 0}{1000}$	(100)m 3	(101)m		460.63	448.62	0	0				(102)
Gains (solar gains				518.44 eather re		l		U	0	0		(102)
(103)m = 0	0	0	0	576.05	548.51	515.89	0	0	0	0		(103)
Space cooling red				lwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (102)m] >	c (41)m	
(104)m = 0	O O	0	0	0	65.38	50.05	0	0	0	0		
<u> </u>	•				!	!	Total	= Sum(104)	=	115.43	(104)
Cooled fraction Intermittency factor	(Table 10b	o)					f C =	cooled	area ÷ (4	1) =	0.68	(105)
(106)m= 0 0	0	0	0	0.25	0.25	0.25	0	0	0	0		
							Total	l = Sum((104)	=	0	(106)
Space cooling requ	1	1	<u> </u>	``	- ` 	 	_					
(107)m= 0 0	0	0	0	0	11.17	8.55	0 T 1 - 1	0	0	0		
								= Sum(107)	=	19.72	(107)
Space cooling requ							` ,) ÷ (4) =			0.35	(108)
9a. Energy require	nents – Inc	lividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heating:	and from a	ooondor	. /ounnlo	monton	, avatam					Γ		(201)
Fraction of space				memary	•		(204)			Į ī	0	╡` ′
Fraction of space		-	, ,			(202) = 1	, ,	(222)			1	(202)
Fraction of total h	•	-				(204) = (2)	02) x [1 –	(203)] =		ļ	1 	(204)
Efficiency of main	space hea	ting syste	em 1								89.5	(206)
Efficiency of seco	ndary/supp	lementar	y heating	g systen	า, %						0	(208)
Cooling System E	nergy Effic	ency Ra	tio								4.73	(209)
Jan F	b Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	_
							l Ocb	l Oct	1101	500	it vvii/yt	ear
Space heating red	uirement (calculate	d above))			ССР	001	1107		KVVIII yC	ear
Space heating red 503.74 414	`	232.2	d above)	0	0	0	0	207.15	362.68	513.77	KVVIII yC	ear
	82 368.62	232.2	116.89		0				I		KWIIIyC	ear (211)
503.74 414	82 368.62 (204)] } x	232.2 100 ÷ (20	116.89		0	0	0	207.15	362.68 405.23	513.77	KVVIIIyC	
503.74	82 368.62 (204)] } x	232.2 100 ÷ (20	116.89	0		0	0	207.15	362.68 405.23	513.77	3038.97	
503.74	368.62 (204)] } x 49 411.87	232.2 100 ÷ (20 259.44	116.89 06) 130.6	0		0	0	207.15	362.68 405.23	513.77	ŕ	(211)
503.74 414 (211)m = {[(98)m x 562.83 463 Space heating fue = {[(98)m x (201)] }	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/	116.89 06) 130.6	0	0	0 0 Tota	0 0 I (kWh/yea	207.15 231.45 ar) =Sum(2	362.68 405.23 211) _{15,1012}	513.77 574.05	ŕ	(211)
503.74	368.62 (204)] } x 49 411.87	232.2 100 ÷ (20 259.44 ry), kWh/	116.89 06) 130.6	0		0 Tota	0 0 I (kWh/yea	207.15 231.45 231.45 0	362.68 405.23 211) _{15,1012}	513.77 574.05 =	ŕ	(211)
503.74 414 (211)m = {[(98)m x 562.83 463 Space heating fue = {[(98)m x (201)] } (215)m= 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/	116.89 06) 130.6	0	0	0 Tota	0 0 I (kWh/yea	207.15 231.45 231.45 0	362.68 405.23 211) _{15,1012}	513.77 574.05 =	ŕ	(211)
503.74	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0	116.89 06) 130.6 /month	0	0	0 Tota	0 0 I (kWh/yea	207.15 231.45 231.45 0	362.68 405.23 211) _{15,1012}	513.77 574.05 =	3038.97	(211)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0 Water heating Output from water	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0	116.89 06) 130.6 /month 0	0 0	0	0 Tota	0 I (kWh/yea	207.15 231.45 ar) =Sum(2) 0 ar) =Sum(2)	362.68 405.23 211) _{15,1012}	513.77	3038.97	(211)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0 0 0 Water heating Output from water 171.53 149	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0	116.89 06) 130.6 /month	0	0	0 Tota	0 0 I (kWh/yea	207.15 231.45 231.45 0	362.68 405.23 211) _{15,1012}	513.77 574.05 =	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0) neater (calconda 155.9) neater	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0	116.89 06) 130.6 /month 0 bove) 133.87	0 0	0 112.97	0 Tota 0 Tota 125.93	0 0 I (kWh/yea	207.15 231.45 231.45 0 ar) =Sum(2 144.98	362.68 405.23 211) _{15,1012} 0 215) _{15,1012}	513.77 574.05 = 0 =	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0 0 Water heating Output from water 171.53 149 Efficiency of water (217)m = 89.5 89	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27	116.89 06) 130.6 /month 0	0 0	0	0 Tota	0 I (kWh/yea	207.15 231.45 ar) =Sum(2) 0 ar) =Sum(2)	362.68 405.23 211) _{15,1012}	513.77	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth	116.89 06) 130.6 /month 0 bove) 133.87	0 0	0 112.97	0 Tota 0 Tota 125.93	0 0 I (kWh/yea	207.15 231.45 231.45 0 ar) =Sum(2 144.98	362.68 405.23 211) _{15,1012} 0 215) _{15,1012}	513.77 574.05 = 0 =	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth	116.89 06) 130.6 /month 0 bove) 133.87	0 0	0 112.97	0 Tota 125.93 89.5	0 0 I (kWh/yea 127.32 89.5 142.26	207.15 231.45 ar) =Sum(3 0 144.98 89.5	362.68 405.23 211) _{15,1012} 0 215) _{15,1012}	513.77 574.05 = 0 =	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth)m	116.89 06) 130.6 /month 0 bove) 133.87	0 0 117.91 89.5	0 0 112.97	0 Tota 125.93 89.5	0 0 I (kWh/yea 127.32	207.15 231.45 ar) =Sum(3 0 144.98 89.5	362.68 405.23 211) _{15,1012} 0 215) _{15,1012} 154.76	513.77 574.05 = 0 = 167.51 89.5	3038.97	(211) (211) (215)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m 0 0 Water heating Output from water	368.62 368.62 (204)] } x 49 411.87 (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth)m 154.5	116.89 06) 130.6 /month 0 bove) 133.87	0 0 117.91 89.5	0 0 112.97	0 Tota 125.93 89.5	0 0 I (kWh/yea 127.32 89.5 142.26	207.15 231.45 ar) =Sum(3 0 144.98 89.5	362.68 405.23 211) _{15,1012} 0 215) _{15,1012} 154.76	513.77 574.05 = 0 = 167.51 89.5	0 89.5	(211) (211) (215) (216) (217)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m = 0	368.62 (204)] } x 49 411.87 I (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth)m 154.5	116.89 06) 130.6 /month 0 bove) 133.87 89.5	0 0 117.91 89.5	0 0 112.97 89.5	0 Tota 0 Tota 125.93 89.5	0 0 (kWh/yea 0 127.32 89.5 142.26 I = Sum(2	207.15 231.45 ar) =Sum(2 0 ar) =Sum(2 144.98 89.5 161.99 19a) ₁₁₂ =	362.68 405.23 211) _{15,1012} 0 215) _{15,1012} 154.76 89.5	513.77 574.05 0 167.51 89.5	0 89.5	(211) (211) (215) (216) (217)
503.74 414 (211)m = {[(98)m x 562.83 463] Space heating fue = {[(98)m x (201)] } (215)m 0 0 Water heating Output from water	368.62 368.62 (204)] } x 49 411.87 (seconda x 100 ÷ (20	232.2 100 ÷ (20 259.44 ry), kWh/ 08) 0 culated a 138.27 89.5 onth)m 154.5	116.89 06) 130.6 /month 0 bove) 133.87	0 0 117.91 89.5	0 0 112.97	0 Tota 125.93 89.5 140.7 Tota	0 0 I (kWh/yea 127.32 89.5 142.26	207.15 231.45 0 144.98 89.5 161.99 19a) ₁₁₂ =	362.68 405.23 211) _{15,1012} 0 215) _{15,1012} 154.76	513.77 574.05 = 0 = 167.51 89.5	0 89.5	(211) (211) (215) (216) (217)

Annual totals Space heating fuel used, main system 1		kWh/year	kWh/year 3038.97
Water heating fuel used			1900.33
Space cooling fuel used			4.17
Electricity for pumps, fans and electric keep-l	hot		
mechanical ventilation - balanced, extract o	r positive input from outside	92.61	(230a)
central heating pump:		30	(230c)
Total electricity for the above, kWh/year	sum of (23	0a)(230g) =	122.61 (231)
Electricity for lighting			254.67 (232)
10a. Fuel costs - individual heating systems	::		
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	3.48 × 0.01 =	105.76 (240)
Space heating - main system 2	(213) x	0 x 0.01 =	0 (241)
Space heating - secondary	(215) x	13.19 × 0.01 =	0 (242)
Water heating cost (other fuel)	(219)	3.48 × 0.01 =	66.13 (247)
Space cooling	(221)	13.19 × 0.01 =	0.55 (248)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.01 =	16.17 (249)
(if off-peak tariff, list each of (230a) to (230g) Energy for lighting	separately as applicable and ap	oply fuel price according to 13.19 x 0.01 =	
Additional standing charges (Table 12)			120 (251)
Appendix Q items: repeat lines (253) and (25	54) as needed		
)(247) + (250)(254) =		342.2 (255)
11a. SAP rating - individual heating systems	S		
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF) [(255	$(5) \times (256)] \div [(4) + 45.0] =$		1.43 (257)
SAP rating (Section 12)			80.07 (258)
12a. CO2 emissions – Individual heating sy	stems including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	656.42 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	410.47 (264)
Space and water heating	(261) + (262) + (263) + (264) =	=	1066.89 (265)
Space cooling	(221) x	0.519 =	2.17 (266)
Electricity for pumps, fans and electric keep-l	hot (231) x	0.519 =	63.63 (267)

Electricity for lighting	(232) x	0.519	=	132.18	(268)
Total CO2, kg/year		sum of (265)(271) =	[1264.86	(272)
CO2 emissions per m²		(272) ÷ (4) =		22.75	(273)
El rating (section 14)				83	(274)

13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	3707.54 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2318.4 (264)
Space and water heating	(261) + (262) + (263) + (264) =		6025.94 (265)
Space cooling	(221) x	3.07	12.81 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	376.4 (267)
Electricity for lighting	(232) x	0 =	781.85 (268)
'Total Primary Energy	sum	of (265)(271) =	7197 (272)
Primary energy kWh/m²/year	(272	?) ÷ (4) =	129.42 (273)

			User D	etails:						
Assessor Name:	Chris Hocknell			Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2	2012		Softwa	are Vei	rsion:		Versio	n: 1.0.4.10	
		Р	roperty.	Address	: Flat 0-1	I-Clean				
Address :										
Overall dwelling dimens	nsions:		۸ro	a(m²)		Av Ho	ight(m)		Volume(m³)	
Basement				<u> </u>	(1a) x		3.1	(2a) =	134.07	(3a)
Ground floor			6	33.89	(1b) x	2	2.6	(2b) =	166.11	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+	(1e)+(1r	1) 1	07.14	(4)			.		
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:										_
<u> </u>	main heating	secondar heating	У	other		total			m³ per hour	
Number of chimneys	0 +	0	+	0	_ = _	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	- - - -	0] = [0	x 2	20 =	0	(6b)
Number of intermittent far	ns					0	x ′	10 =	0	(7a)
Number of passive vents					Ī	0	x '	10 =	0	(7b)
Number of flueless gas fir	res					0	X 4	40 =	0	(7c)
								A * I		
		(2.) (21.) (2		_ 、	_			i	anges per hou	_
Infiltration due to chimney If a pressurisation test has be	•				continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in th		, ,	(/),			(-) (/		0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timb	er frame or	0.35 fo	r masoni	ry constr	uction			0	(11)
if both types of wall are pro	·	rresponding to	the great	ter wall are	a (after			!		-
deducting areas of opening If suspended wooden fl	• / .	ealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	•	,	`	,,					0	(13)
Percentage of windows	and doors draugh	t stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in	cubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabili	ty value, then (18) =	= [(17) ÷ 20]+(8	3), otherw	ise (18) = ((16)				0.15	(18)
Air permeability value applies	s if a pressurisation test	has been dor	ne or a deg	gree air pe	rmeability	is being u	sed	'		_
Number of sides sheltered	d								2	(19)
Shelter factor				` '	[0.075 x (1	[9)] =			0.85	(20)
Infiltration rate incorporati	•			(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified fo		1							1	
	Mar Apr Ma	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe				•		·	•	<u> </u>	ı	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A.P. stadis Classica and	- /-!!- '	(-11			(04 -)	(00-)	•			l	
Adjusted infiltration rat	e (allowi	ng for sr 0.14	0.14	a wina s	o.12	0.12	(22a)m 0.13	0.14	0.14	0.15		
Calculate effective air		1			I	0.12	0.13	0.14	0.14	0.15		
If mechanical ventila	ation:										0.5	(23a)
If exhaust air heat pump								o) = (23a)			0.5	(23b)
If balanced with heat reco	•	•	•		,	,	,				76.5	(23c)
a) If balanced mech					- ` ` 	- ^ ` 	ŕ	 		``	÷ 100]	(24a)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mecha	anicai ve	entilation 0	without	neat rec	overy (r	VIV) (246 1 0	0 m = (2)	$\frac{26}{1}$ $\frac{1}{0}$	23b) 0	0		(24b)
c) If whole house ex								0	0	U		(240)
if (22b)m < 0.5 ×			•	-				.5 × (23b)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation	on or wh	ole hous	e positiv	e input	ventilatio	on from I	oft				l	
if (22b)m = 1, th	en (24d)	m = (22l	o)m othe	rwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]			ı	
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change	1	<u> </u>	<u> </u>	``	ŕ		`				l	(05)
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and he	eat loss p	paramete	er:									
3. Heat losses and he ELEMENT Gros	SS	oaramete Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/F	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gros	SS	Openin	gs			W/m2			<) 			
ELEMENT Gros	SS	Openin	gs	A ,r	m² x	W/m2	=	(W/I	<) 			kJ/K
ELEMENT Gros area Doors	SS	Openin	gs	A ,r	m ² x 2 x ¹	W/m2	eK = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gros area Doors Windows Type 1	SS	Openin	gs	A ,r 2.6	m ² x 2 x ¹ x ¹	W/m2 1.2 /[1/(1.2)+	0.04] = 0.04] =	(W/F 3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2	SS	Openin	gs	A ,r 2.6 13.52 2.73	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/H 3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54 3.51	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02	<)			kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	ss (m²)	Openin	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575	<)			kJ/K (26) (27) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509	\() \(kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = 0.	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2	ss (m²)	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04]	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 Walls Type3 43.	32 38 4 22	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type4	32 32 38 4 22	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.2	32 (m²) 38 4 22 7	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 20.6 Walls Type3 43. Walls Type4 Walls Type4 Cancer 11.4	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.4 Roof Type2 4.8	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22 6.27 11.42 4.83	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

ъ.											_			–
Party o	_					59.06			/F/4/11	\ 0.04	. L			(32b)
				effective wi nternal wal			ated using	i formula 1,	/[(1/U-valu	e)+0.04] a	as given in	paragraph	3.2	
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.12	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	.(32e) =	34247.85	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value	: Medium	[250	(35)
	_		ere the de tailed calc		constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	ible 1f		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<					ſ	36.66	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)						L		
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea	at loss ca	alculated	monthly	У				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		_
Heat Id	ss para	meter (H	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	.12 /12=	133.24	(39)
(40)m=	1.26	1.26	1.26	1.24	1.24	1.23	1.23	1.22	1.23	1.24	1.25	1.25		
				•						Average =	Sum(40) ₁ .	.12 /12=	1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)	I	I		ı			i			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
				<u> </u>			01		30	0.		31		
				l			01	01	30	<u> </u>	00			
4. Wa	iter heat	ing ener	rgy requi	irement:			01	01	30		00	kWh/ye	ar:	
Assum if TF	ed occu A > 13.9	ipancy, I 9, N = 1	N		(-0.0003)2)] + 0.0			2		ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ipancy, I 9, N = 1 9, N = 1	N + 1.76 x	[1 - exp		349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻		9)	kWh/ye	ar:	, ,
Assum if TF if TF Annua	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	: [1 - exp ge in litre	es per da	349 x (TF	FA -13.9 erage =		0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ar:	(42)
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre	es per da 5% if the o	349 x (TF ay Vd,av	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us Sep	ΓFA -13. se target o Oct	9) 100 Nov	kWh/ye 8 0.62 Dec 110.68	ar:	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (⁻ + 36 a water us Sep	ΓFA -13. se target o Oct 102.63 Total = Su	9) 100 Nov 106.65 m(44)112 =	kWh/ye 8 0.62 Dec 110.68	ear: 1207.41	, ,
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 106.65	+ 1.76 x ater usage hot water person per Mar day for ear 102.63	ge in litre usage by r day (all w Apr ach month 98.61	es per da 5% if the a vater use, I May $Vd,m = fa$ 94.58	349 x (TF ay Vd,ave livelling is that and co. Jun ctor from 7 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye 8 0.62 Dec 110.68 c, 1d)		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us 98.61 - 9 kWh/mor 115.06	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 158.96	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 110.68	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 102.63 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = far$ 94.58 $onthly = 4$.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61 98.61 98.61	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68 158.96		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 110.68 content of 164.13	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 102.63 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = far$ 94.58 $onthly = 4$.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61 98.61 98.61	Oct Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 158.96	1207.41	(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan er usage in 110.68 content of 164.13 taneous w 24.62 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water 143.55 vater heatin 21.53 IOSS:	H + 1.76 x Atter usage hot water person per Mar day for ear 102.63 148.13 Ing at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (no. 19.37	es per da 5% if the a vater use, I May Vd,m = fa 94.58	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93	erage = designed to did) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum	Ipancy, I P, N = 1 P, N = 1 e hot was al average litres per p Feb 106.65 hot water 143.55 rater heatin 21.53 loss: e (litres)	H + 1.76 x ater usage hot water person per day for ear 102.63 used - cal 148.13 ang at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (no. 19.37	es per da 5% if the orater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instant (46)m= Water Storag If comm	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volumer	pancy, I P, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres) eating a	H + 1.76 x ater usage hot water person per Mar 102.63 used - cal 148.13 ang at point 22.22 including and no tal 148.13	ge in litre usage by r day (all w Apr ach month 98.61 129.15 f of use (not 19.37 and any so	es per da 5% if the of 5% if th	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26 9me vess	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum munity h vise if no	Ipancy, I P, N = 1 e hot was al average litres per p Feb 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres) eating a p stored loss:	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - cal 148.13 ang at point 22.22 includir and no tal hot water water sale in the cal tal tal tal tal tal tal tal tal tal t	ge in litre usage by a day (all was Apr ach month 98.61 129.15 for use (not appear) and any sound in dwer (this in the contact of the contact and any sound in dwer (this in the contact and any sound in dwer (this in the contact and any sound in dwer (this in the contact and any sound in the contact and an	es per da 5% if the o rater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed of ld) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 9me vess	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46) (47)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water a) If m	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum munity he vise if no storage tanufact	pancy, I Po, N = 1 Po, N = 1 Po hot was Po litres per p 106.65 Potential water 143.55 Potential water 21.53 Toss: e (litres) eating as o stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - cal 148.13 ang at point 22.22 includir and no tal hot water water sale in the cal tal tal tal tal tal tal tal tal tal t	ge in litre usage by a day (all was Apr ach month 98.61 129.15 for use (not apr any sound in dwarf and sound in dwarf (this in oss factor)	es per da 5% if the o rater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed of ld) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 9me vess	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96 47)	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)

Energy lost from water storage, k	•			(48) x (49)	=		1	10		(50)
b) If manufacturer's declared cyl									· [(54)
Hot water storage loss factor from If community heating see section	•	milie/ua	у)				0.	02		(51)
Volume factor from Table 2a							1.	03		(52)
Temperature factor from Table 2b	b						0	.6		(53)
Energy lost from water storage, k	⟨Wh/year			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter (50) or (54) in (55)							1.	03		(55)
Water storage loss calculated for	r each month			((56)m = (55) × (41)r	n				
` '	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated solar storag	- · · · · · · ·	x [(50) – (l	H11)] ÷ (50	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01 28.92 32.01 3	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) from	ո Table 3							0		(58)
Primary circuit loss calculated for	,	, ,	,	` '						
(modified by factor from Table				_						(50)
(59)m= 23.26 21.01 23.26 2	22.51 23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for each m	nonth (61)m = (60) ÷ 36	65 × (41)	m					1	
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water hear	ting calculated	for each	n month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	1
(62)m= 219.41 193.48 203.41 1	182.64 179.2	160.43	154.37	168.98	168.56	189.37	199.87	214.23		(62)
Solar DHW input calculated using Append	dix G or Appendix I	H (negativ	e quantity	v) (enter '0	if no sola	r contributi	on to wate	er heating)		
(add additional lines if FGHRS ar	nd/or WWHRS	applies,	see Ap	pendix (3)					
(63)m= 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
(64)m= 219.41 193.48 203.41 1	182.64 179.2	160.43	154.37	168.98	168.56	189.37	199.87	214.23		_
				·	out from wa				2233.94	(64)
Heat gains from water heating, k	1 1	(0.85		+ (61)m		(46)m	+ (57)m	+ (59)m]	
(65)m= 98.8 87.67 93.48 8	85.74 85.42	78.35	77.17	82.03	81.05	88.81	91.47	97.07		(65)
include (57)m in calculation of	(65)m only if cy	/linder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (see Table 5 a	ınd 5a):									
Metabolic gains (Table 5), Watts										
Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 167.79 167.79 167.79 1	167.79 167.79	167.79	167.79	167.79	167.79	167.79	167.79	167.79		(66)
Lighting gains (calculated in Appe	endix L, equation	on L9 or	· L9a), a	lso see	Table 5				•	
(67)m= 59.59 52.93 43.05 3	32.59 24.36	20.57	22.22	28.89	38.77	49.23	57.46	61.25		(67)
Appliances gains (calculated in A	Appendix L, equ	ation L1	13 or L1	3a), alsc	see Tal	ole 5				
(68)m= 399.08 403.22 392.78 3	370.57 342.52	316.16	298.56	294.41	304.85	327.07	355.11	381.47		(68)
Cooking gains (calculated in App	endix L, equati	on L15	or L15a)	, also se	e Table	5				
(69)m= 54.58 54.58 54.58 \$	54.58 54.58	54.58	54.58	54.58	54.58	54.58	54.58	54.58		(69)
Pumps and fans gains (Table 5a))									
(70)m= 0 0 0	0 0	0	0	0	0	0	0	0		(70)
Losses e.g. evaporation (negative	e values) (Tabl	e 5)								
(71)m= -111.86 -111.86 -111.86 -1	111.86 -111.86	-111.86	-111.86	-111.86	-111.86	-111.86	-111.86	-111.86		(71)
		· · · · ·		<u>-</u>	<u></u>	<u></u>	·			

Water	heating	g gains (T	able 5)													
(72)m=	132.79	` `	125.64	119.08	114.82	10	08.82	103.72	110	.25 1	12.57	119.3	7 127.03	130.48	1	(72)
Total i	nterna	I gains =			ļ		(66)	m + (67)m	ı + (68	3)m + (6	<u>-</u> 69)m + (1	70)m +	(71)m + (72)	m	J	
(73)m=	701.97		671.97	632.74	592.21	5	56.06	535.01	544	.06	566.7	606.17	7 650.11	683.7	1	(73)
6. Sol	ar gain	is:														
			using sola	r flux from	Table 6a	and	assoc	iated equa	tions	to conv	ert to the	e applic	able orientat	ion.		
Orienta		Access F	actor	Area			Flu			g			FF		Gains	
		Table 6d		m²			Tal	ole 6a		Tab	ole 6b		Table 6c		(W)	
Northea	ast _{0.9x}	0.54	X	13.	52	X	1	1.28	x	С).24	x	0.7	=	12.46	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	1	1.28	x	C).24	X	0.7	=	3.59	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	1	1.28	X	C).24	×	0.7	=	5.46	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	2	2.97	X	C).24	×	0.7	=	25.35	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	2	2.97	X	C).24	x	0.7	=	7.3	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	2	2.97	x	C).24	×	0.7	=	11.12	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	4	1.38	x	C).24	×	0.7		45.68	(75)
Northea	ast _{0.9x}	0.77	x	2.7	73	X	4	1.38	x	C).24	×	0.7	=	13.15	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	4	1.38	x	C).24	×	0.7	_ =	20.04	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	6	7.96	x	C).24	×	0.7		75.02	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	6	7.96	x	C).24	×	0.7	=	21.6	(75)
Northea	ast 0.9x	0.77	x	4.1	6	X	6	7.96	x	C).24	X	0.7		32.91	(75)
Northea	ast _{0.9x}	0.54	x	13.	52	X	9	1.35	x	C).24	×	0.7	╡ =	100.84	(75)
Northea	ast 0.9x	0.77	X	2.7	73	X	9	1.35	X	C).24	×	0.7	-	29.03	(75)
Northea	ast 0.9x	0.77	x	4.1	6	X	9	1.35	x	C).24	X	0.7		44.24	(75)
Northea	ast 0.9x	0.54	X	13.	52	X	9	7.38	X	C).24	×	0.7	<u> </u>	107.5	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	9	7.38	x	C).24	×	0.7	=	30.95	(75)
Northea	ast 0.9x	0.77	x	4.1	6	X	9	7.38	X	C).24	X	0.7		47.17	(75)
Northea	ast 0.9x	0.54	X	13.	52	X	,	91.1	X	C).24	×	0.7	=	100.56	(75)
Northea	ast 0.9x	0.77	X	2.7	73	X	,	91.1	x	C).24	X	0.7	=	28.96	(75)
Northea	ast 0.9x	0.77	x	4.1	6	X	,	91.1	X	C).24	X	0.7	=	44.12	(75)
Northea	ast 0.9x	0.54	X	13.	52	X	7	2.63	X	C).24	×	0.7	-	80.17	(75)
Northea	ast 0.9x	0.77	X	2.7	' 3	X	7	2.63	x	C).24	×	0.7	一 -	23.08	(75)
Northea	ast 0.9x	0.77	х	4.1	6	X	7	2.63	x	C).24	×	0.7	=	35.17	(75)
Northea	ast 0.9x	0.54	Х	13.	52	X	5	0.42	x	C).24	×	0.7	=	55.66	(75)
Northea	ast 0.9x	0.77	X	2.7	73	X	5	0.42	x	C).24	×	0.7	=	16.03	(75)
Northea	ast 0.9x	0.77	х	4.1	6	X	5	0.42	x	C).24	×	0.7	=	24.42	(75)
Northea	ast _{0.9x}	0.54	х	13.	52	X	2	8.07	x	C).24	×	0.7		30.98	(75)
Northea	ast _{0.9x}	0.77	x	2.7	' 3	X	2	8.07	x	0).24	X	0.7		8.92	(75)
Northea	ast _{0.9x}	0.77	x	4.1	6	X	2	8.07	x	0).24	×	0.7		13.59	(75)
Northea	ast _{0.9x}	0.54	x	13.	52	X		14.2	x	0).24	×	0.7		15.67	(75)
Northea	ast _{0.9x}	0.77	х			x		14.2	x	0).24	x	0.7	=	4.51	(75)

Northeast 0.9					Г			1			-		_			7(75)
Northeast 0.9		X	4.1		X [14.2] X]		0.24	X	0.7	\dashv	=	6.88	(75)
Northeast 0.9		X	13.	_	X		9.21	X).24	X	0.7	_	=	10.17	(75)
		X	2.7		X		9.21] X]).24	X	0.7	_	=	2.93	(75)
Northeast 0.9	• • • • • • • • • • • • • • • • • • • •	×	4.1	=	X		9.21	X).24	_ ×	0.7	_	=	4.46	(75)
Southeast 0.9	• • • • • • • • • • • • • • • • • • • •	х	3.5	1	X	3	6.79	X).24	X	0.7	_	=	15.04	(77)
Southeast 0.9		×	3.5	1	x L	6	2.67	X	C).24	X	0.7	_	=	25.61	(77)
Southeast 0.9	• • • • • • • • • • • • • • • • • • • •	X	3.5	1	X	8	5.75	X).24	X	0.7		=	35.04	(77)
Southeast 0.9		×	3.5	1	x	1	06.25	X	C).24	X	0.7		=	43.42	(77)
Southeast 0.9	0.77	×	3.5	1	x	1	19.01	X).24	X	0.7		=	48.63	(77)
Southeast 0.9	0.77	X	3.5	1	X	1	18.15	X	C).24	X	0.7		=	48.28	(77)
Southeast 0.9	0.77	x	3.5	1	x	1	13.91	X	C).24	X	0.7		=	46.55	(77)
Southeast 0.9	0.77	X	3.5	1	x	1	04.39	X	C).24	X	0.7		=	42.66	(77)
Southeast 0.9	0.77	x	3.5	1	x [9	2.85	x	C).24	X	0.7		=	37.94	(77)
Southeast 0.9	0.77	X	3.5	1	x	6	9.27	x	C).24	×	0.7		=	28.31	(77)
Southeast 0.9	0.77	х	3.5	1	x	4	4.07	X	C).24	x	0.7		=	18.01	(77)
Southeast 0.9	0.77	х	3.5	1	x	3	1.49	x	C).24	×	0.7		=	12.87	(77)
Southwest _{0.9}	0.77	x	7.5	4	x	3	6.79	1	C).24	x	0.7		=	32.3	(79)
Southwest _{0.9}	0.77	×	7.5	4	x	6	2.67	1	C).24	x	0.7		=	55.02	(79)
Southwest _{0.9}	0.77	x	7.5	4	x [8	5.75	Ī	C).24	×	0.7		=	75.28	(79)
Southwest _{0.9}	0.77	x	7.5	4	x	1	06.25	Ī	C).24	×	0.7		=	93.27	(79)
Southwest _{0.9}	0.77	x	7.5	4	x	1	19.01	Ī	C).24	×	0.7		=	104.47	(79)
Southwest _{0.9}	0.77	х	7.5	4	x [1	18.15	j	C).24	×	0.7		=	103.72	(79)
Southwest _{0.9}	0.77	Х	7.5	4	x [1	13.91	j	C).24	×	0.7		=	99.99	(79)
Southwest _{0.9}	0.77	x	7.5	4	x [1	04.39	j	C).24	×	0.7		=	91.64	(79)
Southwest _{0.9}	0.77	×	7.5	4	x [9	2.85	j	C).24	×	0.7		=	81.51	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [6	9.27	j	C).24	×	0.7	一	=	60.81	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [4	4.07	ĺ	C).24	×	0.7	一	=	38.69	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [3	1.49	j	C).24	×	0.7	一	=	27.64	(79)
					_			_								
Solar gains	in watts, ca	alculated	for each	n month	1			(83)m	n = Sum	n(74)m .	(82)m					
(83)m= 68.8	4 124.4	189.19	266.22	327.21	33	7.62	320.19	272	.73 2	215.56	142.6	1 83.76	58.0)7		(83)
Total gains	– internal a	and solar	(84)m =	(73)m	+ (8	3)m	, watts									
(84)m= 770.	821.52	861.16	898.96	919.42	89	3.67	855.19	816	.79 7	782.26	748.7	7 733.86	741.	77		(84)
7. Mean in	ternal temp	perature	(heating	seasor	n)											
	re during h					rea t	from Tal	ble 9	, Th1	(°C)					21	(85)
Utilisation	factor for g	ains for I	iving are	a, h1,m	n (se	e Ta	ble 9a)									
Ja	n Feb	Mar	Apr	May	Ť	lun	Jul	А	ug	Sep	Oc	Nov	De	ЭС		
(86)m= 1	0.99	0.99	0.97	0.92	C	.8	0.64	0.6	68	0.88	0.97	0.99	1			(86)
Mean inter	nal temper	ature in	living are	ea T1 (f	ollov	v ste	ns 3 to 7	7 in T	able 9	9c) 		•			l	
(87)m= 19.7		20.05	20.36	20.67	_	0.89	20.97	20.		20.81	20.44	20.03	19.	7		(87)
` ′					<u> </u>		!					<u> </u>			I	
Temperatu (88)m= 19.8		19.87	19.88	19.89	1	9.9	19.9	19		19.89	19.89	19.88	19.8	38		(88)
(55)=	1 .0.01	1	.0.00	. 5.00			1					1 .0.00	1			\ - <i>/</i>

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	h2.m (se	ee Table	9a)						
(89)m=	0.99	0.99	0.98	0.96	0.89	0.71	0.5	0.55	0.82	0.96	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)			ı	
(90)m=	18.18	18.35	18.67	19.12	19.54	19.82	19.89	19.88	19.73	19.24	18.64	18.16		(90)
									1	fLA = Livin	g area ÷ (4	1) =	0.15	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwel	ling) = f	LA × T1	+ (1 – fL	.A) × T2					_
(92)m=	18.4	18.57	18.87	19.31	19.71	19.98	20.05	20.04	19.89	19.41	18.85	18.38		(92)
Apply	adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate			ı	
(93)m=	18.4	18.57	18.87	19.31	19.71	19.98	20.05	20.04	19.89	19.41	18.85	18.38		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	nt Ti,m=(76)m an	d re-calc	culate	
uio ai	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>										
(94)m=	0.99	0.99	0.98	0.95	0.88	0.72	0.52	0.57	0.82	0.95	0.98	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m				ı				ı	
(95)m=	764.09	811.05	841.82	854.42	809.22	641.82	442.49	461.6	639.01	713.58	722.85	736.33		(95)
Montl	nly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
							=[(39)m	x [(93)m	– (96)m]			•	
		l	1668.75	l			453.01	477.53	764.89	1171.98	1569.68	1904		(97)
-				i				 		5)m] x (4 ⁻	·		Ī	
(98)m=	853.66	696.67	615.23	383.65	190.24	0	0	0	0	341.05	609.72	868.75		٦
								Tota	ıl per year	(kWh/year) = Sum(9	8) _{15,912} =	4558.96	<u> </u> (98)
Space	e heatin	g require	ement in	kWh/m²	² /year								42.55	(99)
9b. En	ergy red	quiremer	nts – Cor	mmunity	heating	scheme)							
•		-		• .		-		• .	-	a comm	unity sch	neme.		7,000
	•			•	• •	•	heating (Table 1	1) 'U' If N	one			0	(301)
Fraction	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-									up to four (other heat	sources; t	he latter	
			s, geotnerr Commun		aste neat f	rom powe	r stations.	See Appe	naix C.				0.13	(303a)
			heat fro	•	source 2								0.87](303b)
		•	heat fro			HP				(30	02) x (303	a) =	0.13] (304a)
		•	heat fro		•		e 2			(30	02) x (303	b) =	0.87] (304b)
Factor	for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for (commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	a											kWh/year	_
-		-	requirem	nent									4558.96	7
Space	heat fro	m Comr	munity C	:HP					(98) x (30	04a) x (305	5) x (306) :	=	622.3	」 │(307a)
27400		55.711		- ••					(==) == (0	, - (0	, ()			J (= = -)

Chara haat from haat assures 2		(00) × (0	04b) v (205) v (206)		7(207h)
Space heat from heat source 2	Leading a story is 0/ //www. Tal	, , ,	04b) x (305) x (306) =	4164.61	(307b)
Efficiency of secondary/supplementary				0	(308
Space heating requirement from secon	ndary/supplementary system	(98) x (3	(01) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2233.94	
If DHW from community scheme: Water heat from Community CHP		(64) x (3	03a) x (305) x (306) =	304.93	(310a)
Water heat from heat source 2		, , ,	03b) x (305) x (306) =	2040.71	(310b)
Electricity used for heat distribution	0.	01 × [(307a)	(307e) + (310a)(310e)] =	71.33	(313)
Cooling System Energy Efficiency Rati	io			0	(314)
Space cooling (if there is a fixed coolin	g system, if not enter 0)	= (107)	÷ (314) =	0	<u> </u> (315)
Electricity for pumps and fans within democratical ventilation - balanced, extr		e		247.21	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	ar	=(330a)	+ (330b) + (330g) =	247.21	(331)
Energy for lighting (calculated in Appe	ndix L)			420.97	(332)
10b. Fuel costs – Community heating	scheme				
	Fuel kWh/year		Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x		2.97 × 0.01 =	18.48	(340a)
Space heating from heat source 2	(307b) x		4.24 × 0.01 =	176.58	(340b)
Water heating from CHP	(310a) x		2.97 × 0.01 =	9.06	(342a)
Water heating from heat source 2	(310b) x		4.24 × 0.01 =	86.53	(342b)
	(00.4)		Fuel Price		_
Pumps and fans	(331)		13.19 × 0.01 =	02.01	(349)
Energy for lighting	(332)		13.19 × 0.01 =	55.53	(350)
Additional standing charges (Table 12)				120	(351)
Total energy cost	= (340a)(342e) + (345)(354) =			498.78	(355)
11b. SAP rating - Community heating	scheme				
Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$			1.38	(357)
SAP rating (section12)				80.79	(358)
12b. CO2 Emissions – Community hea	ating scheme				7(004)
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit	-	n o ro: -	Emission factor	63	(362)
		nergy Wh/year	Emission factor	kg CO2/year	

Space heating from CHP)	(307a) × 100 ÷ (362) =	987.78 ×	0.22]	213.36	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	302.26 ×	0.52]	-156.87	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	484.02 ×	0.22]	104.55	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	148.11 ×	0.52]	-76.87	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) to	o (366) for the secon	nd fuel	96.7	(367b)
CO2 associated with heat source 2	! [(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	1386.09	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	=	37.02	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	7 2)	=	1507.27	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from im	mersion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =			1507.27	(376)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52	=	128.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	=	218.48	(379)
Total CO2, kg/year	sum of (376)(382) =				1854.06	(383)
Dwelling CO2 Emission Rate	te (383) ÷ (4) =				17.31	(384)
El rating (section 14)					83.67	(385)
13b. Primary Energy – Community	heating scheme					
Electrical efficiency of CHP unit					30.6	(361)
•						
Heat efficiency of CHP unit					63	(362)
•		Energy	Primary	 P.		_
•		Energy kWh/year	Primary factor		63	_
•	(307a) × 100 ÷ (362) =				63 Energy	_
Heat efficiency of CHP unit	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	factor		63 Energy Vh/year	(362)
Heat efficiency of CHP unit Space heating from CHP)		kWh/year	factor		63 Energy Vh/year 1205.09	(362)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	987.78 × 302.26 ×	1.22 3.07		63 Energy Vh/year 1205.09 -927.94	(362) (363) (364)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	987.78 × 302.26 × 484.02 ×	1.22 3.07 1.22 3.07	kv]]]	63 Energy Vh/year 1205.09 -927.94 590.51](362)](363)](364)](365)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	987.78 X 302.26 X 484.02 X 148.11 X	1.22 3.07 1.22 3.07	kv]]]	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7](362)](363)](364)](365)](366)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us $= 2$ [(307b)	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to	1.22 3.07 1.22 3.07 0 (366) for the second	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7	(362) (363) (364) (365) (366) (367b)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP uses $= 2$ [(307b)	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (367b) x (367b) x	1.22 3.07 1.22 3.07 0 (366) for the second 1.22	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84	(362) (363) (364) (365) (366) (367b) (368)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(378)	1.22 3.07 1.22 3.07 0 (366) for the second 1.22	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97	(362) (363) (364) (365) (366) (367b) (368) (372)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comme	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise)	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(378)	1.22 3.07 1.22 3.07 0 (366) for the second 1.22	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77	(362) (363) (364) (365) (366) (367b) (368) (372) (373)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero (-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses a 2 [(307b) on a continuity systems (unless specified otherwise sing (secondary)	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(376) X (309)	1.22 3.07 1.22 3.07 0 (366) for the second 1.22	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero (Energy associated with space heat	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses a 2 [(307b) on a continuity systems (unless specified otherwise continuity (secondary)) immersion heater or instar	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(376) X (309)	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 C) 0	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77 8460.77	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (373) (374)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero (Energy associated with space heat Energy associated with water from	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses a 2 [(307b) on a continuity systems (unless specified otherwise continuity (secondary)) immersion heater or instance and water heating	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(376) X (309) X (309) X (309) X (313) X (309)	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 C) 0	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77 8460.77 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with common if it is negative set (373) to zero (1) Energy associated with space heat Energy associated with water from Total Energy associated with space	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses a 2 [(307b) on a continuity systems (unless specified otherwise continuity (secondary)) immersion heater or instance and water heating ing	987.78 X 302.26 X 484.02 X 148.11 X Sing two fuels repeat (363) to (367b) X (363)(366) + (368)(376) X (309) X (309) X (373) + (374) + (375) = (315) X (315) X (315) X (315) X (315) X (315) X (315) X (315) X (309.78) X (315) X (315) X (315) X (315) X (309.78) X (315)	1.22 3.07 1.22 3.07 1.22 3.07 0 (366) for the secon 1.22 C) 0 1.22 3.07	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77 0 0 8460.77	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with common if it is negative set (373) to zero (1) Energy associated with space heat Energy associated with water from Total Energy associated with space Energy associated with space cool	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use a 2 If there is CHP use a 2 (307b) In unity systems (unless specified otherwise a 2 ing (secondary) immersion heater or instance and water heating and water heating and or pumps and fans within decompositions.	987.78 X 302.26 X 484.02 X 484.02 X 148.11 X Sing two fuels repeat (363) to (363)(366) + (368)(374) + (368)(375) X (309) X (373) + (374) + (375) = (315) X (315) X (315) X (315) X (315) X (315) X (315) X (315) X (315) X (316) X	1.22 3.07 1.22 3.07 1.22 3.07 0 (366) for the secon 1.22 C) 0 1.22 3.07	kV	63 Energy Vh/year 1205.09 -927.94 590.51 -454.7 96.7 7828.84 218.97 8460.77 0 0 8460.77 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376) (377)

Total Primary Energy, kWh/year

sum of (376)...(382) =

10512.08 (383)

				User D	etails:									
Assessor Name: Software Name:	Chris Hoc Stroma FS	_			Strom Softwa	are Vei	rsion:			016363 on: 1.0.4.10				
Address :			Р	roperty	Address	: Flat 0-2	2-Clean							
1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m²)														
Area(m²) Av. Height(m) Vo														
Basement						(1a) x			(2a) =	134.45	(3a)			
Ground floor				6	6.91	(1b) x	2	2.6	(2b) =	173.97	(3b)			
Total floor area TFA = (1	la)+(1b)+(1c)+	(1d)+(1e)+(1n	1) 1	10.28	(4)								
Dwelling volume						(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	308.41	(5)			
2. Ventilation rate:														
	main		econdar	у	other		total			m³ per hou	r			
Number of chimneys	heating 0	+	eating 0] + [0] = [0	x 4	40 =	0	(6a)			
Number of open flues	0	- + -	0	Ī + Ē	0	j = L	0	x2	20 =	0	(6b)			
Number of intermittent fa	ans					,	0	x ²	10 =	0	(7a)			
Number of passive vents	S					Ē	0	x ²	10 =	0	(7b)			
Number of flueless gas f	fires					Ī	0	X 4	40 =	0	(7c)			
						_					_			
									Air ch	nanges per ho	our			
Infiltration due to chimne	•						0		÷ (5) =	0	(8)			
If a pressurisation test has I			ed, proceed	d to (17),	otherwise (continue fr	om (9) to ((16)		_	¬			
Number of storeys in t Additional infiltration	ine aweiling (n	5)						[(0)	11v0 1 =	0	(9)			
Structural infiltration: () 25 for stool o	r timbor f	rama or	0 35 fo	r maconi	v constr	uction	[(9)-	-1]x0.1 =	0	(10)			
if both types of wall are p						•	uction			0	(11)			
deducting areas of open				.										
If suspended wooden	floor, enter 0.2	2 (unseal	ed) or 0.	1 (seale	ed), else	enter 0				0	(12)			
If no draught lobby, er	nter 0.05, else	enter 0								0	(13)			
Percentage of window	s and doors d	raught st	ripped							0	(14)			
Window infiltration					0.25 - [0.2		-			0	(15)			
Infiltration rate					(8) + (10)		, , ,	, ,		0	(16)			
Air permeability value,					•	•	etre of e	nvelope	area	3	(17)			
If based on air permeabi	-									0.15	(18)			
Air permeability value applie Number of sides sheltere	•	on test has	been don	e or a de	gree air pe	rmeability	is being us	sed			7(40)			
Shelter factor	eu				(20) = 1 -	[0.075 x (1	9)] =			0.78	(19)			
Infiltration rate incorpora	nting shelter fac	ctor			(21) = (18) x (20) =	/ -			0.12	(21)			
Infiltration rate modified	-				, , , , ,	,				0.12	(~1)			
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]				
Monthly average wind sp	<u> </u>		Juli	Jui	19	1 200	1 500	1	1 200	J				
(22)m= 5.1 5	4.9 4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	1				

Wind Factor (22a)m = (22)n	n ÷ 4									
(22a)m= 1.27 1.25 1.25		.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (all	uving for shalt	or and wind a		(21a) v ((22a)m	!		<u>.</u>	l	
Adjusted infiltration rate (allo		.12 0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air chang		l l	1	0.11	0.12	0.12	0.10	0.11		
If mechanical ventilation:									0.5	(23a)
If exhaust air heat pump using A) = (23a)			0.5	(23b)
If balanced with heat recovery:	•	•	,	·		Ola)	001.) [(00-)	76.5	(23c)
a) If balanced mechanica (24a)m= 0.27 0.26 0.20		n neat recov .24 0.23	ery (MV)	HR) (24a _{0.23}	m = (2) 0.23	2b)m + (2 0.24	23b) x [²	0.25	÷ 100] 	(24a)
b) If balanced mechanica	ļ	l	ļ	LI				0.23		(244)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 0		0	0	0	0	0	0		(24b)
c) If whole house extract				ا	utside					, ,
if $(22b)m < 0.5 \times (23b)$	-	-				.5 × (23b)			
(24c)m= 0 0 0	0	0 0	0	0	0	0	0	0		(24c)
d) If natural ventilation or										
if $(22b)m = 1$, then $(24b)m = 1$				- ``						(244)
(24d)m= 0 0 0	0	0 0	0	0	0 (05)	0	0	0		(24d)
Effective air change rate - (25)m= 0.27 0.26 0.20		.24 0.23	c) or (24 0.23	0.23	0.23	0.24	0.25	0.25		(25)
(20)111- 0.27 0.20 0.20	0.20 0	0.20	0.20	0.20	0.20	0.24	0.20	0.20		(=3)
3. Heat losses and heat los	·	N 1 4 A				A 3/11				A 3/ 1
3. Heat losses and heat los ELEMENT Gross area (m²)	os parameter: Openings m²	Net Ar A ,ı		U-valu W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gross	Openings						<)			
ELEMENT Gross area (m²)	Openings	, A	m ²	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Openings	A ,ı	m² x 2 x ¹ / ₂	W/m2	K = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,1 2.6	m ² x 2 x ¹ / ₃ x ¹ / ₄	W/m2 1.2 /[1/(1.2)+	K = 0.04] = 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	2.6 13.52 2.73	m ² x 2 x ¹ / ₃ x ¹ / ₃ x ¹ / ₃	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	K = 0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,1 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Openings	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 3.2	Openings m² 34.06	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3	Openings m² 34.06 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79 3.2 43.03	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Floor Type 1 Second Secon	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.75 3.2 43.07 28.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99 10.55	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

											_			_
Party o	_					62.16					L			(32b)
					ndow U-va Is and part		ated using	ı formula 1,	/[(1/U-valu	e)+0.04] a	as given in	paragraph	3.2	
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	_		ere the de tailed calci		constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<					Ī	37.2	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)						_		
Total fa	abric he	at loss							(33) +	(36) =		[108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	У			1	(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		_
Heat Id	ss para	meter (H	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	133.41	(39)
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
									,	Average =	Sum(40) ₁ .	12 /12=	1.21	(40)
Numbe	er of day		nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
											<u> </u>			
4. Wa	iter heat	ing ener	gy requ	irement:								kWh/ye	ear:	
Assum if TF	ed occu A > 13.9	ipancy, I 9, N = 1	N + 1.76 x		(-0.0003	349 x (TF	-A -13.9)2)] + 0.(0013 x (ΓFA -13.		kWh/ye	ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ipancy, I 9, N = 1 9, N = 1	N + 1.76 x	[1 - exp		•		, ,-	,	ΓFA -13.	.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da 5% if the o	ay Vd,av	erage = designed t)2)] + 0.0 (25 x N) to achieve	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da	ay Vd,av	erage = designed t	(25 x N)	+ 36 a water us		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	82	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb	N + 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	y Vd,avelling is not and con Jun	erage = designed to designed to designed to designed to designed to design desi	(25 x N) to achieve Aug	+ 36 a water us Sep	se target o	9) 10°	82 1.09 Dec	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us Sep 99.07	Oct	9) / / Nov	1.09 Dec		(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage ii	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,ave welling is not and con Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Fotal = Su	9) Nov 107.16 m(44) ₁₁₂ =	1.09 Dec 111.2	ear: 1213.1	, ,
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I average the annual that 125 Jan er usage in	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by r day (all w Apr ach month 99.07	es per da 5% if the of the orater use, I May $Vd,m = fa$ 95.03 I I I I I I I I	y Vd,avi welling is not and con Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Fotal = Su th (see Ta	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	Dec 111.2 c, 1d)		(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage ii	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,ave welling is not and con Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ed occu A > 13.9 A £ 13.9 I averag the annual e that 125 Jan 111.2	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = fa$ 95.03 $onthly = 4$.	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,ri 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07 0 kWh/more	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 111.2 content of 164.91 taneous w	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = fa$ 95.03 $onthly = 4$.	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,ri 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/more	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan er usage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x Atter usage hot water person per Mar day for ear 103.11 148.83 Ang at point 22.32	ge in litre usage by a day (all was Apr ach month 99.07 culated month 129.76 for use (not 19.46	es per da 5% if the a vater use, I May Vd,m = fa 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,avelwelling is not and contained from 1 90.98 190 x Vd,rd 107.44 storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/more 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag	ed occu A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 111.2 content of 164.91 taneous w 24.74 storage e volum	ipancy, I ipancy, I	N + 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal 148.83 ng at point 22.32 includir	ge in litre usage by a day (all we have ach month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated months generated gene	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/more 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instant (46)m= Water Storag If comm	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 111.2 content of 164.91 taneous w 24.74 storage e volum	ppancy, I P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss: e (litres) eating a	N + 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal 148.83 ag at point 22.32 includir nd no ta	ge in litre usage by r day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the of	ay Vd,avelwelling is not and constant of and constant of and constant of an area of a storage), and a storage)	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water	ed occu A > 13.9 A £ 13.9 I average the annual that 125 Jan Taneous we 1111.2 content of 164.91 taneous we 24.74 storage e volume munity he vise if no	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by a day (all we have ach month general 129.76 graph and any sound a	es per da 5% if the o rater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water a) If m	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 111.2 content of 164.91 taneous w 24.74 storage e volum munity he vise if no storage tanufact	pancy, I Po, N = 1 Po, N = 1 Po hot was Po litres per p 107.16 Pot water 144.23 Pater heatin 21.63 Toss: Pot litres Pot litres Pot water 21.63 Pot litres Pot water 21.63 Pot litres Pot water 21.63 Pot water heatin 21.63 Pot	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal hot water sale includir and no tal hot water sale includir sale inc	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ng any so ank in dw er (this in	es per da 5% if the of	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water stor	•			(48) x (49) =		1	10		(50)
b) If manufacturer's declar	•								1	(54)
Hot water storage loss fact If community heating see s	,	KVVII/IIII e/u	ay)				0.	.02		(51)
Volume factor from Table 2							1.	.03]	(52)
Temperature factor from Ta	ıble 2b						0	0.6]	(53)
Energy lost from water stor	age, kWh/year			(47) x (51) x (52) x (53) =	1.	.03]	(54)
Enter (50) or (54) in (55)							1.	.03		(55)
Water storage loss calculate	ed for each mon	th		((56)m = (55) × (41)	m			_	
(56)m= 32.01 28.92 32.			32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated sola	r storage, (57)m = (5	66)m x [(50) –	(H11)] ÷ (5	60), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 32.01 28.92 32.	01 30.98 32.	01 30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annua) from Table 3							0		(58)
Primary circuit loss calcula		` ,	` '	` '						
(modified by factor from								1	1	(50)
(59)m= 23.26 21.01 23.	26 22.51 23.	26 22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for e	ach month (61)n	$1 = (60) \div 3$	65 × (41)m						
(61)m= 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water	r heating calcula	ated for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)n	n
(62)m= 220.18 194.16 204	.11 183.25 179	.78 160.93	154.83	169.52	169.1	190	200.56	214.98		(62)
Solar DHW input calculated using	Appendix G or Appe	endix H (negat	ive quantit	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines if FGH	RS and/or WWF	IRS applies	s, see Ap	pendix (G)				,	
(63)m = 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater			1		ı	ı	1	1	1	
(64)m= 220.18 194.16 204	.11 183.25 179	.78 160.93	154.83	169.52	169.1	190	200.56	214.98		_
					out from wa		· ·		2241.41	(64)
Heat gains from water heat				1	i	i]	
(65)m= 99.05 87.9 93.	71 85.94 85.	62 78.52	77.32	82.21	81.23	89.02	91.69	97.32		(65)
include (57)m in calculat	on of (65)m only	if cylinder	is in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains (see Tab	le 5 and 5a):									
Metabolic gains (Table 5),	Natts							1	1	
	ar Apr M	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 168.99 168.99 168	.99 168.99 168	.99 168.99	168.99	168.99	168.99	168.99	168.99	168.99		(66)
Lighting gains (calculated i	n Appendix L, eq	uation L9 c	r L9a), a	lso see	Table 5				•	
(67)m= 60.61 53.84 43.	78 33.15 24.	78 20.92	22.6	29.38	39.43	50.07	58.44	62.3		(67)
Appliances gains (calculate	d in Appendix L,	equation L	.13 or L1	3a), also	see Ta	ble 5				
(68)m= 405.91 410.12 399	0.5 376.91 348	.38 321.58	303.67	299.45	310.07	332.66	361.19	388		(68)
Cooking gains (calculated	n Appendix L, ed	uation L15	or L15a), also se	ee Table	5			-	
(69)m= 54.72 54.72 54.	72 54.72 54.	72 54.72	54.72	54.72	54.72	54.72	54.72	54.72		(69)
Pumps and fans gains (Tal	ole 5a)								_	
(70)m= 0 0 0	0 0	0	0	0	0	0	0	0		(70)
Losses e.g. evaporation (n	egative values) (Table 5)								
(71)m= -112.66 -112.66 -112	.66 -112.66 -112	.66 -112.66	-112.66	-112.66	-112.66	-112.66	-112.66	-112.66		(71)

Water heat	ng gains (1	Table 5)												
(72)m= 133.	 	125.95	119.36	115.08	10	09.05	103.93	110	.49 112.83	119.6	5 127.35	130.81		(72)
Total inter	nal gains =	 :		ļ		(66)	m + (67)m	ı + (68	3)m + (69)m + ((70)m +	(71)m + (72)	m	I	
(73)m= 710		680.28	640.46	599.29	5	62.59	541.24	550	.37 573.37	613.4	3 658.03	692.15		(73)
6. Solar ga	ains:													
		using sola	r flux from	Table 6a	and	l associ	ated equa	tions	to convert to th	e applic	able orientat	ion.		
Orientation			Area			Flu			9_		FF		Gains	
	Table 6d		m²			Tab	le 6a		Table 6b		Table 6c		(W)	
Northeast 0.9	9x 0.54	Х	13.	52	X	1	1.28	x	0.24	x	0.7	=	12.46	(75)
Northeast 0.9	9x 0.77	X	2.7	73	X	1	1.28	x	0.24	x	0.7	=	3.59	(75)
Northeast 0.9	0.77	х	4.′	16	X	1	1.28	x	0.24	X	0.7	=	5.46	(75)
Northeast 0.9	0.54	х	13.	52	X	2:	2.97	x	0.24	x	0.7	=	25.35	(75)
Northeast 0.9	9x 0.77	Х	2.7	73	X	2	2.97	x	0.24	x	0.7	=	7.3	(75)
Northeast 0.9	0.77	х	4.′	16	X	2	2.97	x	0.24	x	0.7	=	11.12	(75)
Northeast 0.9	0.54	х	13.	52	X	4	1.38	x	0.24	x	0.7	=	45.68	(75)
Northeast 0.9	0.77	х	2.7	73	X	4	1.38	x	0.24	X	0.7	=	13.15	(75)
Northeast 0.9	0.77	х	4.′	16	X	4	1.38	x	0.24	x	0.7	=	20.04	(75)
Northeast 0.9	0.54	х	13.	52	X	6	7.96	x	0.24	x	0.7		75.02	(75)
Northeast 0.9	0.77	X	2.7	73	X	6	7.96	x	0.24	×	0.7	=	21.6	(75)
Northeast 0.9	0.77	х	4.′	16	X	6	7.96	x	0.24	x	0.7	=	32.91	(75)
Northeast 0.9	0.54	x	13.	52	X	9	1.35	x	0.24	x	0.7		100.84	(75)
Northeast 0.9	0.77	X	2.7	73	X	9	1.35	x	0.24	×	0.7	=	29.03	(75)
Northeast 0.9	9x 0.77	х	4.	16	X	9	1.35	x	0.24	×	0.7		44.24	(75)
Northeast 0.9	0.54	x	13.	52	X	9	7.38	x	0.24	x	0.7		107.5	(75)
Northeast 0.9	9x 0.77	X	2.7	73	X	9	7.38	x	0.24	×	0.7	=	30.95	(75)
Northeast 0.9	0.77	х	4.	16	X	9	7.38	x	0.24	x	0.7	=	47.17	(75)
Northeast 0.9	0.54	x	13.	52	X	9	1.1	x	0.24	x	0.7		100.56	(75)
Northeast 0.9	0.77	х	2.7	73	x	9	1.1	x	0.24	×	0.7	=	28.96	(75)
Northeast 0.9	0.77	х	4.	16	X	9	1.1	x	0.24	×	0.7	=	44.12	(75)
Northeast 0.9	0.54	х	13.	52	x	7:	2.63	x	0.24	x	0.7	=	80.17	(75)
Northeast 0.9	0.77	х	2.7	73	x	7:	2.63	x	0.24	×	0.7	=	23.08	(75)
Northeast 0.9	0.77	х	4.′	16	x	7:	2.63	x	0.24	x	0.7	=	35.17	(75)
Northeast 0.9	0.54	x	13.	52	X	5	0.42	x	0.24	x	0.7		55.66	(75)
Northeast 0.9	0.77	х	2.7	73	x	5	0.42	x	0.24	×	0.7	=	16.03	(75)
Northeast 0.9	0.77	х	4.	16	X	5	0.42	x	0.24	×	0.7		24.42	(75)
Northeast 0.9	0.54	x	13.	52	X	2	8.07	x	0.24	×	0.7		30.98	(75)
Northeast 0.9	9x 0.77	х	2.7	73	x	2	8.07	x	0.24	X	0.7	=	8.92	(75)
Northeast 0.9	9x 0.77	х	4.	16	x	2	8.07	x	0.24	×	0.7	=	13.59	(75)
Northeast 0.9	0.54	х	13.	52	x	1	4.2	x	0.24	X	0.7	=	15.67	(75)
Northeast 0.9	9x 0.77	x	2.7	73	X	1	4.2	x	0.24	x	0.7		4.51	(75)

North cost a c		_			_		_		_ ,				— ,
Northeast 0.9x	0.77	×	4.1	6	X L	14.2	X	0.24	×	0.7	=	6.88	(75)
Northeast _{0.9x}	0.54	X	13.5	52	X	9.21	X	0.24	×	0.7	_ =	10.17	(75)
Northeast _{0.9x}	0.77	X	2.7	3	X L	9.21	×	0.24	×	0.7	=	2.93	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x _	9.21	X	0.24	X	0.7	=	4.46	(75)
Southwest _{0.9x}	0.77	X	7.5	4	x	36.79	╛	0.24	X	0.7	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	62.67		0.24	X	0.7	=	55.02	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	85.75		0.24	x	0.7	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	106.25		0.24	x	0.7	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	119.01		0.24	x	0.7	=	104.47	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	118.15		0.24	x	0.7	=	103.72	(79)
Southwest _{0.9x}	0.77	x	7.5	4	x	113.91	Ī	0.24	x	0.7	=	99.99	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x F	104.39	Ŧ	0.24	x	0.7	=	91.64	(79)
Southwest _{0.9x}	0.77	x	7.5	4	х	92.85	Ħ	0.24	= x	0.7		81.51	(79)
Southwest _{0.9x}	0.77	x	7.5	4	x F	69.27	i	0.24	x	0.7		60.81	(79)
Southwest _{0.9x}	0.77	X	7.5		x	44.07	Ħ	0.24	x	0.7	_	38.69	(79)
Southwest _{0.9x}	0.77	×	7.5	==	x	31.49	╡	0.24	x	0.7	= =	27.64	(79)
Northwest _{0.9x}	0.77	×	3.5		x	11.28	X	0.24	_ x	0.7	= =	4.61	(81)
Northwest 0.9x	0.77	X	3.5		x \lceil	22.97	X	0.24	x	0.7	= =	9.39	(81)
Northwest _{0.9x}	0.77		3.5		×	41.38	^ x	0.24	^	0.7		16.91	(81)
Northwest 0.9x		=			 		╡		╡ ¦		=		= ' '
Northwest 0.9x	0.77	X	3.5		x _	67.96	」 × ¬	0.24	X	0.7	_ =	27.77	(81)
Northwest 0.9x	0.77	X	3.5		× L	91.35	X	0.24	X	0.7	_ =	37.33	(81)
<u> </u>	0.77	×	3.5		× L	97.38	×	0.24	X	0.7	=	39.8	(81)
Northwest 0.9x	0.77	×	3.5	1	X L	91.1	×	0.24	×	0.7	=	37.23	(81)
Northwest _{0.9x}	0.77	X	3.5	1	× L	72.63	X	0.24	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	X	3.5	1	X L	50.42	X	0.24	X	0.7	=	20.6	(81)
Northwest _{0.9x}	0.77	X	3.5	1	X _	28.07	X	0.24	X	0.7	=	11.47	(81)
Northwest _{0.9x}	0.77	X	3.5	1	x	14.2	X	0.24	X	0.7	=	5.8	(81)
Northwest _{0.9x}	0.77	X	3.5	1	X	9.21	X	0.24	X	0.7	=	3.77	(81)
Solar gains in								n = Sum(74)m				7	
(83)m= 58.42		171.06	250.57	315.91	329		259	.75 198.22	125.77	71.55	48.97		(83)
Total gains – ir			`		`	, 						7	
(84)m= 769.12	813.98	851.34	891.03	915.2	891	72 852.11	810	.12 771.59	739.2	729.57	741.12		(84)
7. Mean inter	nal tempe	rature	(heating	season)								
Temperature	during he	ating p	eriods in	the livi	ng ar	ea from Ta	able 9	Th1 (°C)				21	(85)
Utilisation fac	tor for gai	ns for I	iving are	a, h1,m	(see	Table 9a))						
Jan	Feb	Mar	Apr	May	Jı			ug Sep	Oct	Nov	Dec]	
(86)m= 1	0.99	0.99	0.97	0.93	0.8	1 0.64	0.6	0.89	0.98	0.99	1	7	(86)
Mean internal	tempera	ture in	living are	ea T1 (f	Jlow	stens 3 to	7 in 7	able 9c)	•		•	_	
(87)m= 19.74	19.85	20.06	20.37	20.67	20.	i	20.	<u> </u>	20.44	20.04	19.72	7	(87)
` '							-	Į.		1 -3.0.		J	` '
Temperature					_	_ `	1	<u> </u>	40.01	40.04	40.04	7	(00)
(88)m= 19.9	19.9	19.9	19.91	19.91	19.	19.92	19.	93 19.92	19.91	19.91	19.91		(88)

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	h2.m (se	ee Table	9a)						
(89)m=	0.99	0.99	0.99	0.96	0.89	0.72	0.5	0.56	0.83	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)				
(90)m=	18.24	18.4	18.71	19.16	19.57	19.85	19.91	19.91	19.76	19.26	18.69	18.21		(90)
		ı							1	LA = Livin	g area ÷ (4	4) =	0.14	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = f	LA × T1	+ (1 – fL	A) x T2					_
(92)m=	18.45	18.6	18.9	19.33	19.73	20	20.06	20.06	19.91	19.43	18.88	18.43		(92)
Apply	adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.45	18.6	18.9	19.33	19.73	20	20.06	20.06	19.91	19.43	18.88	18.43		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
ille u	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>				7.09	T GOP			200		
(94)m=	0.99	0.99	0.98	0.95	0.89	0.72	0.52	0.57	0.83	0.96	0.99	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m=	763.17	804.92	834.49	850.77	810.96	645.93	445.84	464.75	638.51	708.01	719.86	736.3		(95)
			rnal tem	i —						.	ı			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			-				=[(39)m :	-``	- 		4575.0	4044 77		(07)
		1853.33		1391.97	1069.2	710.74	456.18	480.77	768.26	1176	1575.8	1911.77		(97)
(98)m=	859.31	704.53	624.14	389.67	192.13	0	$\frac{th = 0.02}{o}$	0	0	348.18	616.28	874.55		
(00)111=	000.01	101.00	02	000.01	102.10			<u> </u>	l per year	<u> </u>		<u> </u>	4608.78	(98)
Snac	e heatin	a requir	ement in	k\/\/h/m²	!/vear					(,(-	- / 10,012	41.79	」`
		• .			•								41.79	
			nts – Cor	· ·			ater heat	ting prov	ided by	a comm	unity sch	nama		
				• .		-	heating (• .	-		urnty 301		0	(301)
Fractio	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme ma	y obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and	up to four	other heat	sources; ti	he latter	_
includes	boilers, h	neat pump	s, geotheri	mal and wa			r stations.			•		,		_
Fraction	on of hea	at from C	Commun	ity CHP									0.13	(303a)
Fraction	on of cor	mmunity	heat fro	m heat s	ource 2								0.87	(303b)
Fraction	on of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fractio	on of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for d	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	g										!	kWh/year	_
-		_	requiren	nent									4608.78	
Space	heat fro	m Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	=	629.1	(307a)
														_

		(00) (0	- " \		7,,,,,,
Space heat from heat source 2			04b) x (305) x (306) =	4210.12	(307b)
Efficiency of secondary/supplementary				0	(308
Space heating requirement from secon	ndary/supplementary system	(98) x (3	01) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2241.41	
If DHW from community scheme: Water heat from Community CHP		(64) x (3	03a) x (305) x (306) =	305.95	(310a)
Water heat from heat source 2		, , ,	03b) x (305) x (306) =	2047.53	(310b)
Electricity used for heat distribution	0.		(307e) + (310a)(310e)] :		` ´ (313)
Cooling System Energy Efficiency Rati			(3.2.2) (3.2.2) (3.2.2)	0	(314)
Space cooling (if there is a fixed coolin		= (107) ÷	÷ (314) =	0	(315)
Electricity for pumps and fans within d	,	(-)			
mechanical ventilation - balanced, extr		le		253.98	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	ar	=(330a)	+ (330b) + (330g) =	253.98	(331)
Energy for lighting (calculated in Appel	ndix L)			428.18	(332)
10b. Fuel costs – Community heating	scheme				
	Fuel kWh/year		Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x		2.97 × 0.01	18.68	(340a)
Space heating from heat source 2	(307b) x		4.24 × 0.01 :	178.51	(340b)
Water heating from CHP	(310a) x		2.97 × 0.01 :	9.09	(342a)
Water heating from heat source 2	(310b) x		4.24 × 0.01 :	86.82	(342b)
			Fuel Price		_
Pumps and fans	(331)		13.19 x 0.01 :	33.5	(349)
Energy for lighting	(332)		13.19 x 0.01 :	56.48	(350)
Additional standing charges (Table 12)				120	(351)
Total energy cost	= (340a)(342e) + (345)(354) =			503.07	(355)
11b. SAP rating - Community heating	scheme				
Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$			1.36	(357)
SAP rating (section12)				81.02	(358)
12b. CO2 Emissions – Community hea	ating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		nergy Wh/year	Emission facto kg CO2/kWh	r Emissions kg CO2/year	

Space heating from CHP)	(307a) × 100 ÷ (362) =	998.57 ×	0.22]	215.69	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	305.56 ×	0.52]	-158.59	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	485.64 ×	0.22]	104.9	(365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	148.61 X	0.52]	-77.13	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363)	to (366) for the seco	nd fuel	96.7	(367b)
CO2 associated with heat source 2	? [(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	1397.78	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	=	37.33	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(3	372)	=	1519.98	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from im	mersion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =			1519.98	(376)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52] =	131.81	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52] =	222.22	(379)
Total CO2, kg/year	sum of (376)(382) =				1874.02	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =				16.99	(384)
El rating (section 14)					83.83	(385)
13b. Primary Energy – Community	heating scheme			_		
Electrical efficiency of CHP unit					30.6	(361)
Heat efficiency of CHP unit					63	(362)
-		Energy	Primary		Energy	(362)
-		Energy kWh/year	Primary factor			(362)
-	(307a) × 100 ÷ (362) =	•	factor		Energy	(362)
Heat efficiency of CHP unit	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	factor		Energy Vh/year	_
Heat efficiency of CHP unit Space heating from CHP)		kWh/year	1.22 3.07		Energy Vh/year	(363)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	998.57 × 305.56 ×	1.22 3.07		Energy Vh/year 1218.25 -938.08	(363)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	998.57 × 305.56 × 485.64 ×	1.22 3.07 1.22 3.07	kv]]]	Energy Vh/year 1218.25 -938.08 592.48	(363) (364) (365)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	998.57 X 305.56 X 485.64 X 148.61 X	1.22 3.07 1.22 3.07 to (366) for the seco	kv]]]	Energy Vh/year 1218.25 -938.08 592.48 -456.22	(363) (364) (365) (366)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us $= 2$	998.57 X 305.56 X 485.64 X 148.61 X Sing two fuels repeat (363)	1.22 3.07 1.22 3.07 to (366) for the seco	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7	(363) (364) (365) (366) (367b)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us e 2 [(307b)	998.57 X 305.56 X 485.64 X 148.61 X 20+(310b)] x 100 ÷ (367b) x	1.22 3.07 1.22 3.07 to (366) for the seco	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86	(363) (364) (365) (366) (367b) (368)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems	\$\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\delta & \text{305.56} & \text{x} & \\ &\delta & \text{485.64} & \text{x} & \\ &\delta & \text{485.64} & \text{x} & \\ &\delta & \text{486.61} & \text{x} & \\ &\delta & \text{310b} & \text{x} & \text{367b} & \text{x} & \\ &\delta & \text{310b} & \text{x} & \text{367b} & \text{x} & \\ &\delta & \text{363} & & \text{366} & \text{+ (368)} & & \\ &\delta & \text{363} & & \text{368} &	1.22 3.07 1.22 3.07 to (366) for the seco 1.22	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82	(363) (364) (365) (366) (367b) (368) (372)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comments	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on nunity systems (unless specified otherwise)	\$\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\begin{align*} &\delta & \text{305.56} & \text{x} & \\ &\delta & \text{485.64} & \text{x} & \\ &\delta & \text{485.64} & \text{x} & \\ &\delta & \text{486.61} & \text{x} & \\ &\delta & \text{310b} & \text{x} & \text{367b} & \text{x} & \\ &\delta & \text{310b} & \text{x} & \text{367b} & \text{x} & \\ &\delta & \text{363} & & \text{366} & \text{+ (368)} & & \\ &\delta & \text{363} & & \text{368} &	1.22 3.07 1.22 3.07 to (366) for the seco 1.22	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11	(363) (364) (365) (366) (367b) (368) (372) (373)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero in	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on nunity systems (unless specified otherwise) ting (secondary)	\$\frac{\text{kWh/year}}{998.57} \times \text{305.56} \times \text{485.64} \times \text{485.64} \times \text{485.64} \times \text{485.64} \times \text{485.63} \text{309} \text{309} \text{500} \text{400} \text{500} \text{400} \text{500} \text{400} \text{500} 5	1.22 3.07 1.22 3.07 to (366) for the seco 1.22 372) C)	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11 8532.11	(363) (364) (365) (366) (367b) (368) (372) (373) (373)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero (Energy associated with space heat	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on nunity systems (unless specified otherwise) ting (secondary) immersion heater or instantant	\$\frac{\text{kWh/year}}{998.57} \times \text{305.56} \times \text{485.64} \times \text{485.64} \times \text{485.64} \times \text{485.64} \times \text{485.63} \text{309} \text{309} \text{500} \text{400} \text{500} \text{400} \text{500} \text{400} \text{500} 5	1.22 3.07 1.22 3.07 to (366) for the seco 1.22 C) 0	kV]] nd fuel] = = =	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11 8532.11	(363) (364) (365) (366) (367b) (368) (372) (373) (373) (374)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with common if it is negative set (373) to zero (373) to zero (373) to zero (373) associated with space heatenergy associated with water from	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on nunity systems (unless specified otherwise) ting (secondary) immersion heater or instance and water heating	998.57 X 305.56 X 485.64 X 148.61 X 200 X (367b) X (363)(366) + (368)(363)(366) + (368)(363) X (309) X (309) X (309) X (309) X (3110) X (312) X (312) X (313) X (309) X	1.22 3.07 1.22 3.07 to (366) for the seco 1.22 C) 0	kV]] nd fuel] = = =	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11 8532.11 0	(363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with common if it is negative set (373) to zero in Energy associated with space heat Energy associated with water from Total Energy associated with space	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on nunity systems (unless specified otherwise) ting (secondary) immersion heater or instance and water heating ing	\$\begin{align*} \text{kWh/year} & 998.57 \times \times \\ \text{305.56} \times \times \\ \text{485.64} \times \times \\ \text{148.61} \times \times \\ \text{310b} \text{310b} \text{310b} \times \text{367b} \times \\ \text{(363)(366)} + (368)(366) \text{363} \\ \text{363} \text{366} \text{368} \text{368} \\ \text{309} \text{x} \\ \text{309} \text{x} \\ \text{373} + (374) + (375) = (315) \text{315} \text{305.56}	1.22 3.07 1.22 3.07 to (366) for the seco 1.22 3.72) C) 0 1.22	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11 0 0 8532.11	(363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with common if it is negative set (373) to zero in Energy associated with space heat Energy associated with water from Total Energy associated with space Energy associated with space cool	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on a continuity systems (unless specified otherwise continuity sing (secondary) immersion heater or instante and water heating ing or pumps and fans within decomposition of the continuity systems (unless specified otherwise continuity systems (un	998.57 X 305.56 X 485.64 X 148.61 X Sing two fuels repeat (363) x (363)(366) + (368)(373) x (373) + (374) + (375) = (315) x (315) x (309.57) x (373) x (374) + (375) = (315) x (315) x (309.57) x (315) x (315) x (309.57) x (315) x (315) x (309.57) x (315) x (315) x (309.57) x (315) x (315) x (309.57) x (315) x (315) x (309.57) x (315) x (1.22 3.07 1.22 3.07 to (366) for the seco 1.22 3.72) C) 0 1.22	kV	Energy Vh/year 1218.25 -938.08 592.48 -456.22 96.7 7894.86 220.82 8532.11 0 0 8532.11 0	(363) (364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376) (377)

Total Primary Energy, kWh/year

sum of (376)...(382) =

10626.33 (383)

		User D	etails:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
		Property /	Address	Flat 1-1	1-Clean				
Address :									
1. Overall dwelling dime	ensions:								
Dagament			a(m²)	(4 -)		ight(m)	7,0->	Volume(m³	_
Basement				(1a) x	2	2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	4.06	(4)					
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	192.56	(5)
2. Ventilation rate:			_		_				
	main seconda heating heating	ıry	other		total			m³ per hou	r
Number of chimneys	0 + 0	+	0] = [0	X	40 =	0	(6a)
Number of open flues	0 + 0	+	0	Ī - [0	X	20 =	0	(6b)
Number of intermittent fa	ans			Ī	0	×	10 =	0	(7a)
Number of passive vents	3			F	0	x	10 =	0	(7b)
Number of flueless gas f	ires			F	0	X -	40 =	0	 _(7c)
J. 12. 12. 12. 12. 13. 13. 13. 13. 13. 13. 13. 13. 13. 13				L					
							Air ch	anges per ho	ur
Infiltration due to chimne	eys, flues and fans = $(6a)+(6b)+$	(7a)+(7b)+(7	7c) =	Γ	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce	ed to (17), c	otherwise o	continue fr	om (9) to	(16)			_
Number of storeys in the	he dwelling (ns)					r(0)	41.04	0	(9)
Additional infiltration	0.25 for steel or timber frame o	vr ∩ 35 for	macanı	v constr	ruction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corresponding			•	uction			0	(11)
deducting areas of opening	ngs); if equal user 0.35	-							_
•	floor, enter 0.2 (unsealed) or (0.1 (seale	d), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ± 1	001 -			0	(14)
Infiltration rate			(8) + (10)			+ (15) =		0	(15)
	q50, expressed in cubic metr						area	3	(17)
•	lity value, then $(18) = [(17) \div 20] +$	•	•	•	0.10 0. 0	,,,,,	diod	0.15	(18)
·	es if a pressurisation test has been do				is being u	sed			」 ` ′
Number of sides sheltered	ed							2	(19)
Shelter factor			(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorpora			(21) = (18)) x (20) =				0.13	(21)
Infiltration rate modified f		1		_		1	Ι_	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	 				l	1	1	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	7	
	ctive air chang	e rate for t	the appli	cable ca	se	ļ	<u> </u>	<u>!</u>		<u>I</u>		
	al ventilation:	and a street No. (6	201-) (00-	-) - - - (-		15// - 1/) (00 -)			0.5	(2
	eat pump using A) = (23a)			0.5	(2
	heat recovery: e	-	_					Ola) (/	201.) [4 (00.0	76.5	(2
a) if balance 4a)m= 0.28	d mechanical		0.25	at recove	0.24	1R) (248 0.24	0.24	2b)m + (2 0.25	23D) × [0.26	0.27) ÷ 100]]	(2
´	d mechanical	!	<u>!</u>		<u> </u>	<u> </u>	<u>!</u>	ļ!		0.21	_	(2
b) ii balance lb)m= 0		0 verillation	T without	0	0	0	0	0	0	0	1	(
c) If whole h	ouse extract v	/entilation	or positiv	/e input v	Lventilatio	n from o	L outside		-			`
lc)m= 0	0 0	0	0	0	0	0	0	0	0	0	1	(
,	ventilation or ventilation of ventilation or ventilation or ventilation (24)		•					0.5]			_	
1d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
Effective air	change rate -	enter (24a	a) or (24k	o) or (24	c) or (24	d) in box	k (25)				_	
5)m= 0.28	0.28 0.27	7 0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(
. Heat losses	s and heat los	s paramet	er:									
EMENT	Gross area (m²)	Openir		Net Ar A ,r		U-valı W/m2		A X U (W/h	<)	k-valu kJ/m²·		A X k kJ/K
oors				2.6	х	1.2	= [3.12				(2
ndows Type	: 1			3.26	x1.	/[1/(1.2)+	0.04] =	3.73				(
indows Type	: 2			3.95	x1.	/[1/(1.2)+	0.04] =	4.52				(
indows Type	: 3			5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(
indows Type	: 4			0.65	x1.	/[1/(1.2)+	0.04] =	0.74				(
				14.69) x	0.11	= [1.6159				(
oor					\neg			7.00	_ [
	67.78	20.5	8	47.2	X	0.15	=	7.08				(
alls Type1	67.78	20.5	=	47.2 21.87	=	0.15	= [= [3.28				
alls Type1 alls Type2			=		7 X		=					(
alls Type1 alls Type2 alls Type3	24.47	2.6	=	21.87	x x	0.15	=	3.28				(1)
oor alls Type1 alls Type2 alls Type3 otal area of e	24.47	2.6	=	21.87	7 x x 7	0.15	=	3.28				(1)
alls Type1 alls Type2 alls Type3 otal area of e arty wall	24.47	2.6	=	21.87 5.93 112.8	x x x 7 x	0.15	=	3.28 0.89				(
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor	24.47	2.6	=	21.87 5.93 112.8 12.38	7 X X 7 3 X	0.15	=	3.28 0.89				(((
alls Type1 alls Type2 alls Type3 atal area of e arty wall arty floor arty ceiling or windows and	24.47	2.6 0	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	7 x x x 7 3 x x 7 5 5	0.15 0.15	= [3.28 0.89 0	s given in	ı paragrapı	h 3.2	
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and include the area	24.47 5.93 lements, m²	2.6 0	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x x x x x x x x x x x x x x x x x x	0.15 0.15	= [= [= [/[(1/U-valu	3.28 0.89 0	s given in	paragrap	h 3.2	
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	24.47 5.93 lements, m² roof windows, uses on both sides of	2.6 0 see effective was internal was X X U)	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x x x x x x x x x x x x x x x x x x	0.15 0.15	= [= [] = [] = []/[(1/U-value) + (32) =	3.28 0.89 0				()
alls Type1 alls Type2 alls Type3 alls Type3 atal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los eat capacity (armal mass	24.47 5.93 lements, m² roof windows, uses on both sides of the side	2.6 0 see effective water of internal water (A x U) (MP = Cm -	indow U-va lls and pan	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul titions	x x x x x x x x x x x x x x x x x x x	0.15 0.15 0 of formula 1 (26)(30)	= [= [] = [] = [/[(1/U-value) + (32) = ((28)	3.28 0.89 0 0 0 0 0 0 0 10)+0.04] a 10) + (32) 11) tive Value:	?) + (32a). Medium	(32e) =	39.55	()

if details o			are not kn	own (36) =	= 0.15 x (3	1)						·		_
Total fal									` '	(36) =			57.74	(37)
Ventilati	т								` ′	·	(25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat tra	nsfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		_
Heat los	ss parar	meter (H	ILP), W/	′m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	74.07	(39)
(40)m=	1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01		
	•									Average =	Sum(40) ₁	12 /12=	1	(40)
Number	of days	s in mor	nth (Tabl	le 1a)		ı				ı		1		
_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wate	er heati	ng ener	gy requi	rement:								kWh/ye	ear:	
_														
Assume				[1 ovn	(0 0003	240 v (TE	FA -13.9	\2\1 + O (1012 v (TEA 12		.34		(42)
	۱۵.9 ۱£ 13.9		+ 1.76 X	[ı - exp	(-0.0003	949 X (11	-A -13.9)2)] + 0.0) X C I U	IFA -13.	.9)			
Annual a		•	iter usac	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
Reduce th	ne annual	average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		0		(- /
not more t	that 125 l	litres per p	person per	day (all w	ater use, l	hot and co	ld)					_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy co	ontent of I	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
		!				Į.			_	rotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instanta	neous wa	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)			'		
(46)m=	21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water st	-					•		•				•		
Storage	volume	e (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comm	•	_			-			' '						
Otherwis			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water st	•		الممسما	ft-		(14) (1/4)	- /-l : \ .							(10)
,				oss facto	or is kno	wn (Kvvr	i/day):					0		(48)
Tempera												0		(49)
Energy I			•	-				(48) x (49)) =		1	10		(50)
Hot wate				cylinder l								02		(51)
If comm		_			- (v)	., 0, 00	7)					.02		(01)
Volume	-	_		-							1.	.03		(52)
Tempera				2b								.6		(53)
Energy I	lost fror	n water	storage	, kWh/ve	ear			(47) x (51)	x (52) x (53) =		.03		(54)
9, '				, , y .				. ,				VV.		()
Enter (5	50) or (5	54) in (5	55)						, , ,			.03		(55)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•			•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			i	1	l	
· /	"=."	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint of the constraints on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calculations (See Press (Table Feb 140.43) (Calculations (Calculati	Table 5 2 Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint of the constraints on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances ga (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculati	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. e	min calculations (Table Feb 140.43 s (calculations (calculations) at 1.53 s (calculations) 51.38 c (calculations) 0 vaporation -93.62	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (Table Feb 140.43 s (calculations (calculations) at 1.53 s (calculations) 51.38 c (calculations) 0 vaporation -93.62	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial from the second seco	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ole 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. etc. (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ole 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	х	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

														_		_
Southwest _{0.9}	<u> </u>	x	0.6	S5	X	10	04.39			0.24	X	0.7	:	= <u>L</u>	7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7		- [59.56	(79)
Southwest _{0.9}	0.77	X	0.6	35	x	9	2.85]		0.24	Х	0.7	-	= [7.03	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	6	9.27]		0.24	x	0.7	-	= [44.43	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7		- [5.24	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7		- [28.27	(79)
Southwesto.9	0.77	X	0.6	35	x	4	4.07]		0.24	x	0.7	-	= [3.34	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	3	1.49]		0.24	x	0.7	-	= [20.2	(79)
Southwest _{0.9}	0.77	X	0.6	35	x	3	1.49			0.24	x	0.7	-	= [2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	= Su	ım(74)m .	(82)m			_		
(83)m= 45.3	3 83.51	130.97	190.29	238.71	24	18.23	234.64	196	.79	151.24	96.8	55.44	38.05	5		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts					_		_		
(84)m= 622.	79 656.94	684.4	712.62	729.21	71	10.09	679.62	649	.56	621.77	598.64	592.15	601.1	2		(84)
7. Mean in	ternal temp	perature	(heating	season)											
Temperatu	re during h	neating p	eriods ir	n the livi	ng a	area 1	from Tal	ole 9,	, Th′	1 (°C)				Г	21	(85)
Utilisation	factor for g	ains for l	living are	ea, h1,m	ı (se	ee Ta	ble 9a)			, ,				<u>L</u>		
Jai	<u>_</u>	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec			
(86)m= 0.99	0.98	0.97	0.93	0.82	C).64	0.47	0.5	51	0.75	0.93	0.98	0.99			(86)
Mean inter	nal temnei	ature in	living ar	-a T1 (fo	الد	w ste	ns 3 to 7	7 in T	able	9c)		_ L				
(87)m= 20.1		20.45	20.69	20.89		0.98	21	2	$\overline{}$	20.95	20.73	20.41	20.14			(87)
` ′		ı		l				l								` '
Temperatu (88)m= 20.0	<u>_</u>	20.07	20.08	20.08	_	eiiing 20.1	20.1	20.	$\overline{}$	20.09	20.08	20.08	20.08	\Box		(88)
(88)m= 20.0	7 20.07	20.07	20.06	20.06		20.1	20.1	20.	·'	20.09	20.06	20.08	20.00	<u>'</u>		(00)
Utilisation	 _	1		· · ·			·	9a)						_		
(89)m = 0.99	0.98	0.96	0.91	0.77	C).55	0.37	0.4	1	0.67	0.91	0.97	0.99			(89)
Mean inter	nal tempei	ature in	the rest	of dwell	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)					
(90)m= 18.9	7 19.12	19.38	19.73	19.98	2	0.08	20.1	20.	.1	20.05	19.78	19.34	18.95	5		(90)
										f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean inter	nal tempei	ature (fo	r the wh	ole dwe	llino	g) = fl	LA × T1	+ (1	– fL	A) × T2						
(92)m= 19.2		19.66	19.98	20.22	_	0.32	20.33	20.		20.29	20.03	19.62	19.26	;		(92)
Apply adju	stment to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate	<u> </u>	!			
(93)m= 19.2	8 19.42	19.66	19.98	20.22	2	0.32	20.33	20.3	33	20.29	20.03	19.62	19.26	5		(93)
8. Space h	eating req	uirement														
Set Ti to th			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	:(76)m an	d re-ca	alcu	late	
the utilisati				1	_		Ι					1	ı	_		
Ja		Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec			
Utilisation					_			١.,		1		1		\neg		(0.4)
(94)m= 0.98	!	0.96	0.9	0.78).58	0.4	0.4	4	0.69	0.91	0.97	0.99			(94)
Useful gair (95)m= 612.3	i	, VV = (94 654.54	4)M X (84 643.07	4)m 569.19	10	20.20	271.17	284	44	430.33	542.31	F74.00	F02 F	7		(95)
` '				l	<u> </u>	08.39	2/1.1/	204	.41	430.33	542.31	574.22	592.5	<u>′</u>		(93)
Monthly av (96)m= 4.3		6.5	perature 8.9	11.7	_	9 8 14.6	16.6	16.	₄ T	14.1	10.6	7.1	4.2	\neg		(96)
Heat loss r				<u> </u>			<u> </u>					/.1	4.2	Ш		(50)
	72 1093.79	988.85	821.51	629.44	_	, VV =	272.05	285.	' T	453.67	J 697.08	930.55	1125.4	11		(97)
(0.7.11-		1 000.00	021.01	1 020.77		. 0.00		L 200	.55	100.01	337.00	1 300.00	1 . 120.5			(=:)

(98)m=	neating	g require	ement fo	r each m	nonth, k\	Wh/mont	th = 0.02	24 x [(97)	m - (95))m] x (4 ⁻	1)m			
_	386.42	304.34	248.73	128.48	44.83	0	0	0	0	115.15	256.56	396.43		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1880.94	(98)
Space	heating	g require	ement in	kWh/m²	/year							Ī	25.4	(99)
8c. Spa	ace co	oling req	uiremen	nt										
Calcula	ated fo	r June, J	luly and	August.	See Tal	ole 10b	T							
L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		·						and exte		·		— i		(100)
(100)m=	0	0 tor for lo	0	0	0	685.27	539.47	552.51	0	0	0	0		(100)
(101)m=	0	tor for lo	0	0	0	0.89	0.94	0.93	0	0	0	0		(101)
· · L				 (100)m x			0.54	0.00	0	Ů	Ů			(101)
(102)m=	0	0	0	0	0	608.06	508.87	511.09	0	0	0	0		(102)
_	لــــــــــــــــــــــــــــــــــــ	gains cal	culated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
•	-			r month,		lwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (*	102)m]x	(41)m	
(104)m=	0	0	0	0	0	103.63	156.51	127.74	0	0	0	0		
									Tota	= Sum(104)	= [387.89	(104)
Cooled									f C =	cooled	area ÷ (4	ł) =	0.6	(105)
Intermitt					0	0.05	0.05	0.05			0			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0 l = Sum((104)	0		(106)
Space o	coolina	reauiren	nent for	month =	(104)m	× (105)	× (106)r	n	TOLA	ı = Surrı(1 .U/1)	= [0	(100)
(107)m=	0	0	0	0	0	15.57	23.51	19.19	0	0	0	0		
_									Tota	= Sum(107)	=	58.27	(107)
Space o	cooling	requiren	nent in k	kWh/m²/y	ear/				(107)) ÷ (4) =		Ī	0.79	(108)
9b. Ene	rgy req	uiremen	nts – Cor	mmunity	booting									
	rt ic uca			,	nealing	scheme						_		
				iting, spa	ce cooli	ng or wa	ater heat	ting prov			unity sch	ieme.		7,004)
Fraction	of spa	ice heat	from se	iting, spa	ace cooli supplen	ng or wa	ater heat neating (ting prov (Table 11			unity sch	neme.	0	(301)
Fraction	of spa	ice heat	from se	iting, spa	ace cooli supplen	ng or wa	ater heat neating (unity sch	ieme.	0	(301)
Fraction Fraction The comm	n of spa n of spa munity so	ice heat ice heat theme may	from se from co	iting, spa condary/ mmunity	ace cooli 'supplen' system	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	neme.	1	╡`
Fraction Fraction The comm	n of spa n of spa munity so poilers, h	ice heat ice heat theme may eat pumps	from set from co obtain he g, geotherr	nting, space condary/ mmunity teat from se mal and wa	ace cooli 'supplen' system	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	[1	╡`
Fraction The comminctudes be Fraction	n of spa n of spa munity so poilers, h n of hea	ace heat ace heat theme may eat pumps at from C	from ser from co obtain he s, geothern commun	nting, space condary/ mmunity teat from se mal and wa	ace cooli (supplem system everal sour este heat fi	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	[1 e latter	(302)
Fraction The comminctudes be Fraction Fraction	n of spa munity so boilers, h n of hea n of con	ace heat ace heat theme may eat pumps at from Community	from ser from con y obtain he s, geotherr commun heat from	iting, spa condary, mmunity eat from se mal and we ity CHP	ace cooli supplem system everal sour aste heat for	ng or wanentary I 1 — (30° ces. The prometors	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one up to four (·	sources; th	1 e latter 0.13	(302)
Fraction The commincludes to Fraction Fraction Fraction	n of spa n of spa munity so boilers, h n of hea n of con n of tota	ace heat ace heat theme may eat pumps at from Conmunity all space	from ser from con y obtain he s, geothern commun heat from heat from	nting, spacondary, mmunity eat from se mal and wa ity CHP m heat s	ace cooling of the co	ng or wanentary I 1 - (30° ces. The prom power	ater hear neating (1) = procedure r stations.	(Table 11	1) '0' if n CHP and	one up to four d	other heat	sources; th	1 e latter 0.13 0.87	(302) (303a) (303b)
Fraction The comminctudes be Fraction Fraction Fraction Fraction	n of spa n of spa munity so poilers, h n of hea n of con n of tota n of tota	ace heat ace heat theme may eat pumps at from C nmunity al space	from ser from co obtain he s, geotherr commun heat from heat from	nting, spacondary, mmunity eat from se mal and we ity CHP m heat s m Comn m comm	ace coolider of system system source 2 cource 2 counity he	ng or wanentary I 1 - (30° ces. The prom power HP at source	ater hear neating (1) = procedure r stations.	(Table 11	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13	(302) (303a) (303b) (304a)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction	n of spa munity so poilers, h n of hea n of con n of tota n of tota or cont	ace heat ace heat whene may eat pumps at from Conmunity all space all space rol and contact and contac	from ser from co or obtain he s, geotherr commun heat from heat from heat from charging	nting, spacondary, mmunity eat from se mal and we ity CHP m heat s m Comn m comm	ace coolider of system system steep source 2 cource 2 courcy Claunity he (Table 4)	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87	(302) (303a) (303b) (304a) (304b)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction	n of spa munity so poilers, h n of hea n of con n of tota n of tota or cont tion los	ace heat theme may eat pumps at from C nmunity al space al space rol and c as factor	from ser from co or obtain he s, geotherr commun heat from heat from heat from charging	nting, spacondary, mmunity eat from semal and we ity CHP m heat semal comment of the comment of	ace coolider of system system steem ource 2 nunity Claunity he (Table 4	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87 1	(302) (303a) (303b) (304a) (304b) (305) (306)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction Fraction Fraction Fraction	n of spa n of spa nunity so poilers, h n of hea n of con n of tota n of tota or cont tion los heating	ace heat acc heat acc	from ser from con y obtain he s, geothern commun heat from heat from heat from charging (Table 1	nting, spacondary, mmunity eat from semal and waity CHP m heat sem Commer comme	ace coolider of system system steem ource 2 nunity Claunity he (Table 4	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87 1 1.05	(302) (303a) (303b) (304a) (304b) (305) (306)

		_
Space heat from heat source 2 (98) x (304b) x (305) x (306) =	1718.24	(307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating		7
Annual water heating requirement If DHW from community scheme:	2063.55	_
Water heat from Community CHP (64) x (303a) x (305) x (306) =	281.67	(310a)
Water heat from heat source 2 (64) x (303b) x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	41.42	(313)
Cooling System Energy Efficiency Ratio	4.73	(314)
Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) =	12.33	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	158.57](330a)
warm air heating system fans	0	(330b)
pump for solar water heating	0	(330g)
Total electricity for the above, kWh/year =(330a) + (330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix L)	325.25	(332)
10b. Fuel costs – Community heating scheme		
Fuel Fuel Price kWh/year (Table 12)	Fuel Cost £/year	
Space heating from CHP $(307a) \times 2.97 \times 0.01 =$	7.63	(340a)
Space heating from heat source 2 $(307b) \times 4.24 \times 0.01 =$	72.85	(340b)
Water heating from CHP $(310a) \times 2.97 \times 0.01 =$	8.37	(342a)
Water heating from heat source 2 $(310b) \times 4.24 \times 0.01 =$	79.93	(342b)
Fuel Price_		_
Space cooling (community cooling system) (315) x 0.01 =	1.63	(348)
Pumps and fans (331) x 0.01 =	20.92	(349)
Energy for lighting (332) 13.19 $\times 0.01 =$	42.9	(350)
Additional standing charges (Table 12)	120	(351)
Total energy cost = (340a)(342e) + (345)(354) =	354.21	(355)
11b. SAP rating - Community heating scheme		
Energy cost deflator (Table 12)	0.42	(356)
Energy cost factor (ECF) $[(355) \times (356)] \div [(4) + 45.0] =$	1.25	(357)
SAP rating (section12)	82.57	(358)
12b. CO2 Emissions – Community heating scheme		
Electrical efficiency of CHP unit	30.6	(361)
Heat efficiency of CHP unit	63	(362)

		Energy kWh/year	Emission factoring kg CO2/kWh	r Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	407.54 ×	0.22	88.03	(363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	124.71 ×	0.52	-64.72	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) to	o (366) for the second fu	uel 96.7	(367b)
CO2 associated with heat source 2	[(307)	b)+(310b)] x 100 ÷ (367b) x	0.22	= 804.87	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 21.5	(372)
Total CO2 associated with commu	nity systems	(363)(366) + (368)(3	72)	= 875.24	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	nmersion heater or instanta	nneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		875.24	(376)
CO2 associated with space cooling	9	(315) x	0.52	= 6.4	(377)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52	= 82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 168.8	(379)
Total CO2, kg/year	sum of (376)(382) =			1132.74	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			15.29	(384)
El rating (section 14)				87.25	(385)
13b. Primary Energy – Community	heating scheme				
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme			30.6	361)
13b. Primary Energy – Community	heating scheme	Energy	Primary	30.6	
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor	30.6	361)
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =			30.6 63 P.Energy	361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor	30.6 63 P.Energy kWh/year	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year 407.54 x	factor	30.6 63 P.Energy kWh/year	(361) (362) (363)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$	kWh/year 407.54	1.22 3.07	30.6 63 P.Energy kWh/year 497.2	(361) (362) (363) (364)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	407.54 X 124.71 X 447.1 X	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02	(361) (362) (363) (364) (365)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	407.54 X 124.71 X 447.1 X 136.81 X	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02	(361) (362) (363) (364) (365) (366)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 407.54	1.22 3.07 1.22 3.07 0 (366) for the second fu	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02 uel 96.7	(361) (362) (363) (364) (365) (366) (367b)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 407.54	1.22 3.07 1.22 3.07 0 (366) for the second for	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02 uel 96.7 = 4546.04	(361) (362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) con munity systems	kWh/year 407.54	1.22 3.07 1.22 3.07 0 (366) for the second full 1.22	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02 uel 96.7 = 4546.04 = 127.15	(361) (362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comments	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise)	kWh/year 407.54	1.22 3.07 1.22 3.07 0 (366) for the second full 1.22	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02 uel 96.7 = 4546.04 = 127.15 = 4912.98	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise ting (secondary)	kWh/year 407.54	1.22 3.07 1.22 3.07 0 (366) for the second for	30.6 63 P.Energy kWh/year 497.2 -382.85 545.46 -420.02 uel 96.7 = 4546.04 = 127.15 = 4912.98 4912.98	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)

Total Primary Energy, kWh/year	sum of (376)(382) =				6436.16	(383)
Energy associated with electricity for lighting	(332))) x		3.07	=	998.51	(379)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	486.81	(378)
Energy associated with space cooling	(315) x		3.07	=	37.86	(377)

		User De	etails:						
Assessor Name:	Chris Hocknell			a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012			are Vei				n: 1.0.4.10	
	· ·	Property A	Address	Flat 1-2	2-Clean				
Address :									
1. Overall dwelling dime	ensions:								
Dagament		Area	• •	(4 -)		ight(m)	7,0->	Volume(m³	_
Basement				(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 76	6.06	(4)					
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	197.76	(5)
2. Ventilation rate:			_		_				
	main seconda heating heating	ry (other		total			m³ per hou	r
Number of chimneys	0 + 0	+ [0] = [0	X ·	40 =	0	(6a)
Number of open flues	0 + 0	= + =	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent fa	ans			, 	0	X	10 =	0	(7a)
Number of passive vents	3			F	0	X	10 =	0	(7b)
Number of flueless gas f	ires			F	0	x	40 =	0	(7c)
				L					(10)
							Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$	7a)+(7b)+(7	7 c) =	Γ	0		÷ (5) =	0	(8)
	peen carried out or is intended, proced	ed to (17), o	therwise o	continue fr	om (9) to	(16)	ı		-
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration	OF for atoal or timber frame a	r 0 25 for	maaan	, constr	untion	[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber frame on the contract of the contract			•	uction			0	(11)
deducting areas of openi	ings); if equal user 0.35	-		·			,		_
•	floor, enter 0.2 (unsealed) or ().1 (seale	d), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped	(n 25 ₋ In 2	x (14) ÷ 1	001 -			0	(14)
Infiltration rate					12) + (13) ·	+ (15) =		0	(15)
	q50, expressed in cubic metr						area	0	(16)
•	lity value, then $(18) = [(17) \div 20] +$	-	•	•	cuc or c	лисюрс	arca	0.15	(18)
·	es if a pressurisation test has been do				is being u	sed		0.10	()
Number of sides sheltered	ed							3	(19)
Shelter factor		((20) = 1 -	[0.075 x (1	[9)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor	((21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified f						1	1	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp					1			1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
						-	!	ı	

djusted infiltra.		<u> </u>			т —	i 	r` ′	ì	T 0.40	0.40			
0.15 Calculate effec	0.15 Ctive air c	0.14 hanae i	0.13 rate for t	0.12 he appli	0.11 icable ca	0.11 se	0.11	0.12	0.12	0.13	0.14		
If mechanica		_									Γ	0.5	(2
If exhaust air he	eat pump us	sing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	o) = (23a)		Ī	0.5	(2
If balanced with	heat recov	ery: effic	iency in %	allowing	for in-use f	actor (fron	n Table 4h) =			[76.5	(2
a) If balance	d mechai	nical ve	entilation	with he	at recov	ery (MV	HR) (24a	a)m = (2)	2b)m + (23b) × [1 - (23c)	÷ 100]	
24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
b) If balance	d mechai	nical ve	entilation	without	heat red	covery (I	MV) (24b	m = (22)	2b)m + (2	23b)			
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h	ouse extr า < 0.5 x			•	•				.5 × (23b)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)n	ventilation n = 1, the								0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change r	ate - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)					
25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
3. Heat losse	s and hea	at loss p	paramet	er:									
LEMENT	Gross area (Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	≺)	k-value kJ/m²·k		A X k kJ/K
oors					2.6	X	1.2	=	3.12				(2
/indows Type	: 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(2
/indows Type	2				3.95	_x 1	/[1/(1.2)+	0.04] =	4.52				(2
lindows Type	3				5.51	_x 1	/[1/(1.2)+	0.04] =	6.31				(2
/indows Type	4				0.65	_X 1	/[1/(1.2)+	0.04] =	0.74				(2
loor					14.36	3 x	0.11	=	1.5796				(2
Valls Type1	38.14		20.5	3	17.56	x	0.15	=	2.63				(2
Valls Type2	23.92		2.6		21.32	2 x	0.15	=	3.2				(2
Valls Type3	5.95		0		5.95	x	0.15	=	0.89				(2
Valls Type4	29.51	$\overline{}$	0		29.5	1 x	0.15	<u> </u>	4.43			ī	(2
otal area of e	lements,	m²			111.8	8						_	(3
arty wall					12.35	5 x	0	=	0			7 [(3
arty floor					61.7	一						7 =	(3
arty ceiling					76.06	5				j		ī	(3
for windows and include the area						lated using	g formula 1	/[(1/U-valu	ue)+0.04] a	ıs given in	paragraph	3.2	
abric heat los	s, W/K =	S (A x	U)				(26)(30) + (32) =				39.42	(3
leat capacity	Cm = S(A)	(xk)						((28).	(30) + (32	2) + (32a).	(32e) =	27990.0	6 (3
' '													

		.		ulation.										$\overline{}$
	Ū	•	,		using Ap	•	K						18.24	(36
	of therma abric hea		are not kn	own (36) =	= 0.15 x (3	11)			(33) +	(36) =			57.66	(37
			alculated	l monthly	V					•	25)m x (5)		37.00	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
3)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat tr	ansfer c	oefficier	nt. W/K		!	!	!	ļ	(39)m	= (37) + (37)		<u>I</u>	J	
9)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24]	
					<u> </u>	<u> </u>			,	L Average =	Sum(39) ₁ .	12 /12=	73.62	(3
eat Ic	ss para	meter (F	HLP), W	m²K					(40)m	= (39)m ÷	(4)	•	,	
0)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		<u> </u>
ımbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.97	(4
311100	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
,							ļ	ļ					I	
\//2	ter heat	ing ener	gy requi	rement:								kWh/y	aar:	
. ,,	itor ricat	ing chei	gy roqui	TOTTION.								IXVVII/ y	car.	
		pancy, I						\ a \.		40		38		(
			+ 1.76 x	[1 - exp	(-0.0003	349 x (TI	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
ı+ I L	V T. 1.7 (
	A £ 13.9 Laverag	•	ater usac	ne in litre	es per da	av Vd av	erage =	(25 x N)	+ 36		90	82	1	(
nua	averag	e hot wa						(25 x N) to achieve		se target o		.82]	(-
nua _{duce}	averag	e hot wa Il average	hot water	usage by		lwelling is	designed			se target o		.82]	(
nnua duce t more	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed i	Aug		se target o		.82 Dec]	(
nnua duce t more	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed i	Aug	a water us	· ·	<i>-</i>	<u> </u>]	(
nnua duce t more t wate	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed i	Aug	a water us	· ·	<i>-</i>	<u> </u>]	
nnua duce t more t wate	averag the annua that 125 Jan er usage ir	e hot wa al average litres per p Feb a litres per 96.27	hot water person per Mar day for ea	usage by day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 85.37	Jun ctor from 3	designed and all displayed by the second sec	Aug (43) 85.37	Sep	92.63 Total = Su	Nov 96.27 m(44) ₁₁₂ =	Dec 99.9	1089.8	
inua duce t more t wate)m= ergy o	averag the annual that 125 Jan er usage ir 99.9	e hot wa al average litres per p Feb a litres per 96.27	Mar day for ea 92.63 used - cal	Apr ach month 89	5% if the orater use, I May $Vd,m = fa$ 85.37 $conthly = 4$	Jun ctor from 8 81.73	designed and desig	Aug (43) 85.37	Sep 89	Oct 92.63 Total = Su tth (see Ta	96.27 m(44) ₁₁₂ = ables 1b, 1	99.9 c, 1d)	1089.8	
nnua duce t more t wate)m= ergy o	averag the annua that 125 Jan er usage ir	e hot wa al average litres per p Feb a litres per 96.27	hot water person per Mar day for ea	usage by day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 85.37	Jun ctor from 3	designed and all displayed by the second sec	Aug (43) 85.37	Sep 89 6 kWh/more 103.86	92.63 Total = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
nnua educe t more ot wate 1)m= eergy (Jan 99.9 content of	Feb n litres per 96.27 hot water 129.57	Mar day for ea 92.63 used - cale	Apr ach month 89 culated mo	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4.	Jun ctor from 1 81.73 190 x Vd,r	Jul Table 1c x 81.73 m x nm x E 89.44	Aug (43) 85.37	Sep 89 6 kWh/more	92.63 Total = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1	99.9 c, 1d)	1089.8	((
nnua duce t more t t wate t wate m= ergy o	Jan 99.9 content of	Feb n litres per 96.27 hot water	Mar day for ea 92.63 used - cale	Apr ach month 89 culated mo	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4.	Jun ctor from 1 81.73 190 x Vd,r	Jul Table 1c x 81.73 m x nm x E 89.44	Aug (43) 85.37 07m / 3600 102.63	Sep 89 6 kWh/more	92.63 Total = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
nnua duce t more t t wate t wate mergy (i)m= mstant	Jan er usage ir 99.9 content of	Feb nlitres per 96.27 hot water 129.57 atter heatin 19.44	Mar day for ea 92.63 used - cale 133.7	Apr ach month 89 culated mo 116.57	5% if the covater use, I May Vd,m = fa 85.37 onthly = 4. 111.85	Jun ctor from 8 81.73 190 x Vd,r 96.52	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in	Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	89 89 103.86 1 to (61)	92.63 Total = Su 121.03 Total = Su	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	99.9 = c, 1d) 143.47		
nnua duce t more t water)m= ergy (nstant	Jan 99.9 content of 148.15 daneous w 22.22 storage	e hot was all average litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06	Apr ach month 89 culated mo 116.57 of use (no	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage),	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42	Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	Sep 89 103.86 1 to (61) 15.58	Oct 92.63 Total = Sunth (see Tail 121.03) Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	99.9 = c, 1d) 143.47		
nnua duce t more t wate t)m= ergy (i)m= nstant ater orag	average the annual e that 125 Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h	Feb Feb Plitres per Plitres pe	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage litres in	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t wate ergy (in)m= nstant ater orag herw	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h	Feb plitres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage litres in	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa	Sep 89 103.86 15.58 ame vess	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t wate ergy (in)m= mstant orag comri herw ater	Jan 99.9 content of 148.15 staneous w 22.22 storage e volum munity h vise if no	Feb Feb 1 litres per per per per per per per per per per	Mar day for ea 92.63 used - call 133.7 ng at point 20.06 includin nd no ta hot water	Apr ach month 89 116.57 of use (not) 17.48 ag any so ank in dwer (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		(
nnua duce t more t wate t wate ergy (initial)m= astani astar orag common herw ater of f m	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no	Feb litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ag at point 20.06 includin nd no talc hot water eclared leaders on per per per per per per per per per per	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw er (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t)m= ergy t si)m= ater orag comr herw ater t) If m	average the annual e that 125 Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufaction	e hot was all average litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot wate eclared le	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		(
nnua educe t more t wate t more for wate t more for wate t more for more fo	Jan er usage ir 99.9 content of 148.15 daneous w 22.22 storage e volum munity h vise if no storage rature fa r lost fro	Feb n litres per 96.27 hot water 129.57 ater heatin 19.44 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no tal hot water eclared le m Table storage	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw er (this in oss facto 2b , kWh/ye	5% if the orater use, I May $Vd,m = fa$ 85.37 $0nthly = 4$. 111.85 $0 hot water$ 16.78 polar or W $velling, e$ $orater use, I$	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar	designed and desig	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vessers) enter	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		(
nnua educe t more t wate t more solution t wate solution nstant orag commither ater orag ther ater orag ther ater orag orag ther ater orag orag orag orag orag orag orag ora	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufact rature fa	Feb of litres per per per per per per per per per per	Mar day for ear 92.63 used - call 133.7 ag at point 20.06 including and no tall hot water eclared less storage eclared of the colored of t	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		(.) (.) (.) (.) (.)
nnua educe t more t wate t more to wate t more to t wate t more to t wate t more to t wate t more to t wate t more	Jan 99.9 content of 148.15 faneous w 22.22 storage e volum munity h vise if no storage anufaction fanufaction ter storage in lost fro inanufaction storage in lost fro inanufaction in anufaction	Feb Feb 1/10/10/10/10/10/10/10/10/10/10/10/10/10	Mar day for ear 92.63 used - call 133.7 ag at point 20.06 including and no tall hot water eclared less storage eclared of the colored of t	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Table	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52 0		(.) (.) (.) (.) (.)
nnua educe t more of wate thorward nstant orag committer cater orag committer interv orag interv orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag orag	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufacti rature fa v lost fro anufacti ter stora munity h e factor	Feb of litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includir nd no ta hot water eclared le storage eclared of factor fr ee section	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in cylinder I com Tabl on 4.3	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	92.63 Total = Sunth (see Tail 121.03 Total = Sunth 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82 47)	Dec 99.9 = c, 1d) 143.47 = 21.52 0		(44 (44 (44 (44 (45) (45) (45)

Energy lost from water	r otorogo	Is\A/b/s				(47) v (54)) v (E2) v (E0)			ı	(E.A)
Energy lost from wate Enter (50) or (54) in (•	, KVVII/yt	zai			(47) X (51)) x (52) x (53) =		.03		(54) (55)
Water storage loss ca	•	or each	month			((56)m = ((55) × (41)	m	1.	.03		(55)
	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
(56)m= 32.01 28.92 If cylinder contains dedicate											 ix H	(30)
(57)m= 32.01 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
` '	ļ ļ	T 11							ļ	<u> </u>		(58)
Primary circuit loss (as Primary circuit loss ca	,			50\m - 1	(58) <u>+</u> 36	S5 ~ (11)	ım			0		(30)
(modified by factor f			`	,	` '	` '		r thermo	stat)			
(59)m= 23.26 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m		ı	ı		l	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required for	water he	eating ca	alculated	l for eac	h month	(62)m =	: 0.85 × ((45)m +	 (46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input calculated	using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	l	
(add additional lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water hea	ater				!		•			•	•	
(64)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
						Outp	out from wa	ater heate	r (annual)₁	12	2079.74	(64)
Heat gains from water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n1 + 0 8 x	(1/46)m	+ (57)m	+ (59)m	1	_
						. (0./	.,	`[(+0)111	· (01)	. (00)111	1	
(65)m= 93.48 83.02	88.68	81.55	81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93]	(65)
(65)m= 93.48 83.02 include (57)m in cal		81.55	81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
	culation o	81.55 of (65)m	81.41 only if c	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see	culation of the Table 5	81.55 of (65)m and 5a	81.41 only if c	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal	culation of the Table 5	81.55 of (65)m and 5a	81.41 only if c	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table	culation of the Table 5	81.55 of (65)m and 5a	81.41 only if c	74.89 ylinder i	73.96 s in the o	78.35 dwelling	77.33 or hot w	84.47 ater is fr	86.72 rom com	91.93 munity h		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb	culation of a Table 5 (a) 5), Watt	81.55 of (65)m and 5a ts Apr 143.03	81.41 only if c : : : : ::::::::::::::::::::::::::::	74.89 ylinder i	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03	culation of a Table 5 (a) 5), Watt	81.55 of (65)m and 5a ts Apr 143.03	81.41 only if c : : : : ::::::::::::::::::::::::::::	74.89 ylinder i	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula	culation of Table 5 (a) Watt Mar 143.03 (a) atted in Ap 33.97	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72	81.41 only if c : May 143.03 L, equati	74.89 ylinder is Jun 143.03 ion L9 o 16.23	73.96 s in the o Jul 143.03 r L9a), a	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77	culation of Table 5 (a) Watt Mar 143.03 (a) atted in Ap 33.97	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72	81.41 only if c : May 143.03 L, equati	74.89 ylinder is Jun 143.03 ion L9 o 16.23	73.96 s in the o Jul 143.03 r L9a), a	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate)	culation of the Earth of the Ea	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72 Append 292.44	81.41 only if c : May 143.03 L, equati 19.22 dix L, eq 270.31	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21	culation of the Earth of the Ea	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72 Append 292.44	81.41 only if c : May 143.03 L, equati 19.22 dix L, eq 270.31	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69	culation of the Europe Solution of the Europe	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72 Append 292.44 opendix 51.69	May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula	culation of the Europe Solution of the Europe	81.55 of (65)m and 5a ts Apr 143.03 opendix 25.72 Append 292.44 opendix 51.69	May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0	culation of the culation of th	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Append 292.44 opendix 51.69 ia) 0	May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat 51.69	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 com com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains	culation of the culation of th	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Append 292.44 opendix 51.69 ia) 0	May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat 51.69	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 com com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation (71)m= -95.35 -95.35	culation of the English Coulation of the Engli	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 o iive valu	81.41 only if c): May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat 51.69 0 es) (Tab	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 ile 5)	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 0 see Tal 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation	culation of the English Coulation of the Engli	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 o iive valu	81.41 only if c): May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat 51.69 0 es) (Tab	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 ile 5)	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 0 see Tal 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains (72)m= 125.65 123.55	culation of the Table 5 a 5), Watte Mar 143.03 atted in Approximated in App	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Appendix 51.69 oa) o cive valu -95.35	81.41 only if co May 143.03 L, equati 19.22 dix L, equati 270.31 L, equati 51.69 0 es) (Tab	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatic (71)m= -95.35 -95.35 Water heating gains (culation of the Table 5 a 5), Watte Mar 143.03 atted in Approximated in App	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Appendix 51.69 oa) o cive valu -95.35	81.41 only if co May 143.03 L, equati 19.22 dix L, equati 270.31 L, equati 51.69 0 es) (Tab	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains (72)m= 125.65 123.55 Total internal gains =	culation of the Earth of the Ea	81.55 of (65)m and 5a ats Apr 143.03 opendix 25.72 Appendix 51.69 5a) 0 cive valu -95.35	81.41 only if co May 143.03 L, equati 19.22 dix L, eqi 270.31 L, equati 51.69 0 es) (Tab -95.35	74.89 ylinder is Jun 143.03 ion L9 o 16.23 uation L 249.51 tion L15 51.69 0 lle 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0 -95.35	77.33 or hot w Sep 143.03 Table 5 30.6 See Tall 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35 113.53 (70)m + (7	86.72 rom com Nov 143.03 45.34 280.24 51.69 0 -95.35 120.45 1)m + (72)	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	X	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	x	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	x	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	x	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	x	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75		0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	X	0.65	x	118.15]	0.24	x	0.7] =	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	x	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
				-		-		-		-		

Southwest		X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest).9x 0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwest	0.77 0.77	x	0.6	S5	X	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwest	0.77 0.77	×	5.5	51	X	6	9.27			0.24	x	0.7	=	44.43	(79)
Southwest).9x 0.77	X	0.6	S5	x	6	9.27			0.24	x	0.7	=	5.24	(79)
Southwest).9x 0.77	x	5.5	51	x	4	4.07			0.24	x	0.7	=	28.27	(79)
Southwest	0.77 0.77	X	0.6	35	x	4	4.07			0.24	x	0.7	=	3.34	(79)
Southwest	0.77	x	5.5	51	x	3	1.49			0.24	X	0.7	=	20.2	(79)
Southwest	0.77	X	0.6	65	x	3	1.49			0.24	x	0.7		2.38	(79)
	'			_	•										
Solar gain	s in watts, c	alculated	for eac	h month				(83)m	= St	ım(74)m .	(82)m			_	
(83)m= 45	5.33 83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.05		(83)
Total gain	s – internal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts					-	_	_	
(84)m= 63	2.31 666.4	693.47	721.08	737.03	71	17.34	686.56	656	6.6	629.18	606.65	600.84	610.35		(84)
7. Mean	internal tem	perature	(heating	season)										
	ture during l		`		<i>'</i>	area f	from Tab	ole 9,	Th1	1 (°C)				21	(85)
•	n factor for g	٠.			-					` ,					
	an Feb	Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	7	
(86)m= 0.	.99 0.98	0.97	0.93	0.82	(0.63	0.46	0.5	5	0.74	0.93	0.98	0.99	1	(86)
Mean into	ernal tempe	rature in	living ar	ea T1 (fo	الد	w sta	ns 3 to 7	in T	ahle	9c)		-1		_	
	0.2 20.3	20.48	20.71	20.9	_	0.98	21	21	$\overline{}$	20.96	20.75	20.44	20.18	٦	(87)
` ′	I	ı	l	<u> </u>				l				1		_	` '
· —	ture during l	20.1	20.11	20.11	_	elling 0.12	20.12	20.	_	20.12	20.11	20.11	20.1	٦	(88)
(88)m= 20	7.09 20.1	20.1	20.11	20.11		0.12	20.12	20.	12	20.12	20.11	20.11	20.1		(00)
	n factor for g	1	i		_	·	r	r –						_	
(89)m = 0.	.99 0.98	0.96	0.9	0.77	().55	0.37	0.4	1	0.67	0.91	0.97	0.99		(89)
Mean into	ernal tempe	rature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_	
(90)m= 19	0.05 19.19	19.45	19.78	20.02	2	0.11	20.12	20.	12	20.08	19.83	19.41	19.03		(90)
										f	LA = Livi	ng area ÷ (4	4) =	0.26	(91)
Mean into	ernal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1 -	– fL	A) × T2					
(92)m= 19	0.34 19.48	19.71	20.02	20.24	2	0.33	20.35	20.3	35	20.31	20.07	19.67	19.32		(92)
Apply ad	justment to t	he mean	interna	l temper	atu	re fro	m Table	4e, \	whe	re appro	priate	-!		_	
(93)m= 19	0.34 19.48	19.71	20.02	20.24	2	0.33	20.35	20.3	35	20.31	20.07	19.67	19.32		(93)
8. Space	heating req	uirement													
	the mean in		•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
	ation factor f			1			l	· .	Ī	_ 1		1	I _	7	
	an Feb	Mar	Apr	May	<u></u>	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
	n factor for g .98 0.98	0.96	0.9	0.78		0.57	0.39	0.4	2	0.69	0.9	0.97	0.99	7	(94)
` ′		L	<u> </u>).57	0.39	0.4	ادا	0.09	0.9	0.97	0.99		(34)
	ains, hmGm 1.82 650.21	663.11	649.75	572.29	40	08.52	270.92	284.	23	431.77	548.6	582.65	601.8	٦	(95)
` ′	average exte	<u> </u>	<u> </u>		<u> </u>		1 2.0.02	L	0	.01.77	5-10.0	1 502.00	1 301.0	_	(00)
	.3 4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	7	(96)
· ·	rate for me		<u> </u>									1		_	` '
	28.3 1090.51	985.89	819.34	627.57	_	15.88	271.64	285.	' T	452.57	695.54	928.43	1122.57	7	(97)
. ,				I			<u> </u>	Ь				1	<u> </u>		•

Space heating requirement in kWh/m²/year Sum 89]	Space heatin	ıg require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
Space heating requirement in kWh/m²/year Space S	(98)m= 376.82	295.88	240.15	122.1	41.13	0	0	0	0	109.32	248.96	387.45		
Second S								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	1821.82	(98)
Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m 0 0 0 0 0 0 0 681.81 536.74 549.81 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Space heating	g require	ement in	kWh/m²	²/year								23.95	(99)
Sample S	8c. Space co	oling red	quiremen	nt								_		<u> </u>
Heat loss rate Lm (cslculated using 25°C internal temperature and external temperature from Table 10 (100)me	Calculated fo	r June, c	July and	August.	See Tal	ole 10b	,			,	,	•		
Cooled fraction Cooled fraction Face Face F					<u> </u>	L		<u> </u>	<u> </u>					
Utilisation factor for loss hm						·	i	1		<u> </u>		$\overline{}$		(100)
Cooled fraction Cooled fra	,			U		001.01	530.74	549.61	U		0	0		(100)
Useful loss, hmLm (Watts) = (100)m x (101)m		1		0	0	0.9	0.95	0.93	0	0	0	0		(101)
(102) (102) (102) (102) (102) (102) (103) (104) (105) (106	` '	nmLm (V			(101)m	<u> </u>	<u> </u>			<u> </u>				, ,
(103)m 0		- `			`	r	509.45	512.46	0	0	0	0		(102)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 3 x (98)m (104)m to zero if (104)m < 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Gains (solar	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
set (104)m to zero if (104)m < 3 × (98)m (104)m = 0 0 0 0 0 0 0 106.88 161.24 131.96 0 0 0 0 0 Total = Sum(1.04) = 400.08 (104) (104)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(/			_					l					(103)
Cooled fraction Cooled	•	•				dwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
Total = Sum(104) = 400.08 (104)	`	T		· `	i –	106.88	161.24	131.96	0	0	0	0		
Cooled fraction Intermittency factor (Table 10b) (106)m=		<u> </u>					<u> </u>		Tota	<u> </u>	104)	└	400.08	(104)
Total = Sum(104) = 0 0 0 0 0 0 0 0 0 0	Cooled fractio	n								,	,	4) =	0.59	(105)
Total = Sum(104) = 0 (108) Space cooling requirement for month = (104)m × (105) × (106)m		- `							·					
Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(1,07) = 58.52 (107)	(106)m= 0	0	0	0	0	0.25	0.25	0.25	l	l	l	<u> </u>		7
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 58.52 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.77 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 — (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) x (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (308) Space heating Annual space heating requirement	Space cooling	requirer	ment for	month -	· (104)m	× (105)	✓ (106)r	m	I ota	I = Sum(104)	= [0	(106)
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.77 (108) 9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 – (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 0.13 (303a) Fraction of community heat from heat source 2 (302) x (303a) = 0.13 (304a) Fraction of total space heat from community CHP (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement 1821.82	· —				`		_ `		0	0	0	0		
Spb. Energy requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none O (301) Fraction of space heat from community system 1 — (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP O.13 (303a) Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP (302) x (303a) = O.87 (304b) Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement		1	ļ.		ļ.	ļ.	ļ.		Tota	l = Sum(107)	=	58.52	(107)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none [301] Fraction of space heat from community system 1 – (301) = [302] The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP [303] Fraction of community heat from heat source 2 [303] Fraction of total space heat from Community CHP [304] Fraction of total space heat from community heat source 2 [304] Fraction of total space heat from community heat source 2 [305] Fraction of total space heat from community heat source 2 [306] Fraction of total space heat from community heat source 2 [307] Fraction of total space heat from community heat source 2 [308] Fraction of total space heat from community heat source 2 [309] Fraction of total space heat from community heat source 2 [309] Fraction of total space heat from community heat source 2 [300] Fraction of total space heat from community heat source 2 [300] Fraction of total space heat from community heat source 2 [300] Fraction of total space heat from community heat source 2 [301] Fraction of total space heat from community heat source 2 [302] Fraction of total space heat from community heat source 2 [303] Fraction of total space heat from community heat source 2 [304] Fraction of total space heat from community heat source 2 [305] Fraction of total space heat from community heat source 2 [306] Fraction of total space heat from community heat source 2 [307] Fraction of total space heat from community heat source 2 [308] Fraction of total space heat from community heat source 2 [309] Fraction of total space heat from community heat source 2 [309] Fraction of total space heat from community heat source 2 [300] Fraction of total space heat from community heat	Space cooling	requirer	ment in k	:Wh/m²/	year				(107)) ÷ (4) =		Ī	0.77	(108)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 1	9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme	;					L		
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from											unity sch	neme.		_
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1821.82	Fraction of spa	ace heat	from se	condary	/supplen	nentary I	heating	(Table 1	1) '0' if n	one			0	(301)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1	Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 0.13 (303a) (304a) (302) × (303b) = (302) × (303b) = (305) (305) (306) (306) (306) (307) (308) (308) (309) (30										up to four	other heat	sources; th	e latter	
Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1.05 (306)			•		aste neat f	rom powei	r stations.	See Appei	naix C.			Γ	0.13	(303a
Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement (302) × (303a) = 0.13 (304a) (302) × (303b) = 0.87 (305) (305) (305) (306)				,	ource 2							L		╡`
Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1821.82		•								(0	00) (000	_\ [=
Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement 1821.82		•			•					•	, ,	Ĺ	0.13	╡`
Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1.05 (306) KWh/year 1821.82	Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Space heating Annual space heating requirement kWh/year 1821.82	Factor for con	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Annual space heating requirement 1821.82	Distribution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m				Γ	1.05	(306)
	Space heatin	g										_	kWh/yea	r
Space heat from Community CHP (98) x (304a) x (305) x (306) = 248.68 (307a)	Annual space	heating	requirem	nent									1821.82	
	Space heat fro	om Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306) :	-	248.68	(307a)

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1664.23	(307b)
Efficiency of secondary/supplementary heating	system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/sup	oplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2079.74	7
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	283.88	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	1899.84	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =		(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling system	n, if not enter 0)	= (107) ÷ (314) =	12.38	(315)
Electricity for pumps and fans within dwelling (•			
mechanical ventilation - balanced, extract or po	sitive input from outsid	9	162.85	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Appendix L)			332.22	(332)
10b. Fuel costs – Community heating scheme				
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP			£/year	(340a)
Space heating from CHP Space heating from heat source 2	kWh/year	(Table 12)	£/year 7.39	(340a) (340b)
,	kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	£/year 7.39 70.56	
Space heating from heat source 2	kWh/year (307a) x (307b) x	(Table 12) 2.97	7.39 70.56 8.43	(340b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55	(340b) (342a)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55	(340b) (342a)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48	(340b) (342a) (342b) (348)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82	(340b) (342a) (342b) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120	(340b) (342a) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120	(340b) (342a) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120 353.87	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120 353.87	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x SAP rating (section12) 12b. CO2 Emissions – Community heating scheme	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120 353.87	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357) (358)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x) SAP rating (section12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332))(342e) + (345)(354) =	(Table 12) 2.97	£/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120 353.87	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357)

		Energy kWh/year	Emission factor kg CO2/kWh	r Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	394.73 ×	0.22	85.26	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	120.79 ×	0.52	-62.69	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP u	sing two fuels repeat (363) to	o (366) for the second fu	uel 96.7	(367b)
CO2 associated with heat source 2	2 [(307	b)+(310b)] x 100 ÷ (367b) x	0.22	= 796.11	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 21.26	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	72)	= 865.71	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	nmersion heater or instanta	aneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		865.71	(376)
CO2 associated with space cooling	9	(315) x	0.52	= 6.43	(377)
CO2 associated with electricity for	pumps and fans within dw	elling (331)) x	0.52	= 84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 172.42	(379)
Total CO2, kg/year	sum of (376)(382) =			1129.08	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			14.84	(384)
El rating (section 14)				87.5	(205)
<u>.</u>				07.0	(385)
13b. Primary Energy – Community	heating scheme				
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme			30.6	(361)
13b. Primary Energy – Community	heating scheme	Energy	Primary	30.6	
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor	30.6	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =		•	30.6 63 P.Energy	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor	30.6 63 P.Energy kWh/year](361)](362)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year 394.73 ×	factor 1.22	30.6 63 P.Energy kWh/year](361)](362)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = −(307a) × (361) ÷ (362) =	394.73 X 120.79 X	1.22 3.07	30.6 63 P.Energy kWh/year 481.57](361)](362)](363)](364)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	394.73 × 120.79 × 450.61 ×	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31](361)](362)](363)](364)](365)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP u	xWh/year 394.73 x 120.79 x 450.61 x 137.89 x	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31](361)](362)](363)](364)](365)](366)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2	394.73 X 120.79 X 450.61 X 137.89 X Sing two fuels repeat (363) to	1.22 3.07 1.22 3.07 0 (366) for the second fu	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31 96.7](361)](362)](363)](364)](365)](366)](367b)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2 [(307) on	kWh/year 394.73	1.22 3.07 1.22 3.07 0 (366) for the second function of the secon	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31 gel 96.7 = 4496.56](361)](362)](363)](364)](365)](366)](367b)](368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2 [(307) on munity systems	kWh/year 394.73	1.22 3.07 1.22 3.07 0 (366) for the second function (366) for	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31 96.7 = 4496.56 = 125.77](361)](362)](363)](364)](365)](366)](367b)](368)](372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comme	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307a) x (361) ÷ (362) = If there is CHP use 2 [(307a) x (361) ÷ (362) = [(307a) x (361) x (361) ÷ (362) = [(307a) x (361) x (361) x (361) x (362) = [(307a) x (361) x (361) x (361) x (362) = [(307a) x (361) x (361) x (361) x (362) x (361) x	kWh/year 394.73	1.22 3.07 1.22 3.07 0 (366) for the second function (366) for	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31 96.7 = 4496.56 = 125.77 = 4859.51](361)](362)](363)](364)](365)](366)](367b)](368)](372)](373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with committee if it is negative set (373) to zero	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307a) x (361) ÷ (362) = [(307a) x (361) x (362) = [(307a) x (361) x (362) = [(307a) x (361) x (362) = [(307a) x (361) x (362) = [(307a) x (361) x (362) = [(307a) x (362) x (362) x (362) = [(307a) x (362) x	394.73 X 120.79 X 450.61 X 137.89 X Sing two fuels repeat (363) to b)+(310b)] × 100 ÷ (367b) × (313) × (363)(366) + (368)(376)	1.22 3.07 1.22 3.07 0 (366) for the second function of the secon	30.6 63 P.Energy kWh/year 481.57 -370.81 549.74 -423.31 96.7 = 4496.56 = 125.77 = 4859.51 4859.51	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)

Total Primary Energy, kWh/year	sum of (376)(382) =				6417.4	(383)
Energy associated with electricity for lighting	(332))) x		3.07	=	1019.91	(379)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	499.96	(378)
Energy associated with space cooling	(315) x		3.07	=	38.02	(377)

		User D	etails:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
		Property <i>I</i>	Address	: Flat 2-	1-Clean				
Address :									
1. Overall dwelling dime	ensions:								
Dagament			a(m²)	44.		ight(m)	٦,, ١	Volume(m³	_
Basement			4.06	(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 7	4.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	192.56	(5)
2. Ventilation rate:			- 41		4-4-1			2	
	main seconda heating heating	iry	other		total			m³ per hou	r
Number of chimneys	0 + 0	+	0	= [0	X	40 =	0	(6a)
Number of open flues	0 + 0	+	0	= [0	X.	20 =	0	(6b)
Number of intermittent fa	ins			Ī	0	X	10 =	0	(7a)
Number of passive vents	3			Ī	0	x	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	x -	40 =	0	(7c)
				_				_	_
							Air ch	anges per ho	ur
	ys, flues and fans = $(6a)+(6b)+$			Ę	0		÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in t	peen carried out or is intended, proce	ed to (17), c	otherwise (continue fr	om (9) to	(16)			7(0)
Additional infiltration	ne aweiling (ns)					[(9)	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame of	or 0.35 for	r masoni	v constr	uction	[(0)	. j	0	(11)
if both types of wall are p	resent, use the value corresponding			•					 ` ′
deducting areas of openia	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or () 1 (spale	معام (امر	antar ()					(12)
If no draught lobby, en	,	J. I (Seale	iu), eise	enter o				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	o ama accio araagin emprea		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	ur per s	quare m	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] +$	•	•	•		·		0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	one or a deg	gree air pe	rmeability	is being u	sed			_
Number of sides sheltered	ed		(0.0)					2	(19)
Shelter factor			(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorpora	•		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f		1			1	1		1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	 						1	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
								-	

Adjusted infiltration r	ate (allow	ing for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective a	•	rate for t	he appli	cable ca	se						_	
If mechanical vent		and the N. (O	10l-) (00-			NIE\\ - (l) (00-)			0.5	(23a
If exhaust air heat pur			, ,	,	. `	,, .	,	o) = (23a)			0.5	(23b
If balanced with heat re	-	-	_								76.5	(230
a) If balanced med		1	.	1	, ` ` ` 	- ^ ` -	ŕ	r ´ `		- ` `) ÷ 100] ¬	40.4
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a
b) If balanced med			ı —		, , `	, ``	í `	, 		1	٦	
(24b)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole house of if (22b)m < 0.5			•					5 v (23h	2)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0	1	(240
d) If natural ventila	tion or wh	nole hous	se positiv	ve input	ventilati	on from	loft				_	
if (22b)m = 1,			•	•				0.5]				
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(240
Effective air chang	e rate - e	nter (24a) or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and	heat loss	paramete	er.									
ELEMENT Gr	oss a (m²)	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-valu kJ/m²·		A X k kJ/K
Doors	,			2.6	x	1.2		3.12	$\stackrel{'}{\Box}$			(26)
Windows Type 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	=			(27)
Windows Type 2				3.95	〓 .	/[1/(1.2)+	· 0.04] =	4.52	=			(27)
Windows Type 3				5.51		/[1/(1.2)+	· 0.04] =	6.31	=			(27)
Windows Type 4				0.65	二 .	/[1/(1.2)+	· 0.04] =	0.74	=			(27)
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7.78	20.58	8	47.2	=			7.08	-		\neg	(29)
Walla Tura O	4.47	2.6		21.87		0.15		3.28	북 ¦		룩 늗	(29)
-	.93	0	_	5.93	=	0.15	-	0.89	<u>-</u>		႕	(29)
Total area of elemen					=	0.15		0.09	[
	13, 111			98.18	=							(31)
Party floor				12.38	=	0	=	0	<u> </u>		┥	(32)
Party floor				74.06	=				Ĺ		╡	(32a
Party ceiling				74.06					[(32b
* for windows and roof wi ** include the areas on bo					lated using	g formula :	/[(1/U-valu	ie)+0.04] a	as given in	n paragrapi	h 3.2	
Fabric heat loss, W/I	< = S (A x	(U)				(26)(30) + (32) =				37.93	(33)
Heat capacity Cm =	S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	27828.4	(34)
Thermal mass paran	notor (TM)	P = Cm -	- TFA) ir	n kJ/m²K			Indica	ntive Value	: Medium		250	(35)
mormar made parar	ierei (i ivii	·	,									
For design assessments can be used instead of a	where the de	etails of the	,	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
For design assessments	where the de	etails of the culation.	construct		•	recisely the	e indicative	e values of	f TMP in Ta	able 1f	11.04	(36)

Total fabric heat loss Ventilation heat loss calculated monthly Ventilation heat loss calculated monthly (38)me 337 (25)m x (5) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (38)me (37) 17.59 17.39 16.36 16.18 15.16 15.16 15.16 14.96 15.57 16.18 16.58 16.39 (38)me (37) (37) (38)m (38)m (,		_
Salar									. ,	•	,,		48.97	(37)
17.8 17.8 17.8 17.3 16.30 16.18 15.16 15.16 14.96 15.57 16.18 16.58 16.99 (38)		1		· ·	í					ı —		D	1	
Heat transfer coefficient, W/K (39)m = (877)		<u> </u>	_					Ť	<u> </u>					(38)
(39)me 66.77 66.36 66.36 66.35 65.15 64.14 64.14 63.93 64.54 65.15 65.55 65.96 Heat loss parameter (HLP), W/m²K	` /	L		10.50	10.10	10.10	10.10	14.50		<u> </u>		10.55		(55)
Average Sum(30)				65.25	65.15	64.14	64.14	62.02	· · ·	`		65.06		
Heat loss parameter (HLP), W/m²K	(39)111= 00.77	00.57	00.50	00.00	03.13	04.14	04.14	03.93					65.3	(39)
Average = Sum(40), /12	Heat loss para	ameter (H	HLP), W	m²K								.127		 ` ′
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.9	0.9	0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		_
### A. Water heating energy requirement: ### Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA = 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usage to twelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usage to twelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usa, hot and codd) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) ### (44)m= 98.77 95.17 91.58 87.98 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 ### Total = Sum(44). v= 1077.45 (44) ### Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables to, lt.) (d) ### Linstantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Linstantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Linstantaneous water heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: 3) If manufacturer's declared loss factor is known (kWh/day): ### Community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): ### Declaration of the properties of the properties of the day of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties o	Number of day	ys in mo	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	.12 /12=	0.88	(40)
### Assumed occupancy, N If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N	(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
Assumed occupancy, N													•	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Assumed occi	inancy	N									24	l	(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)p = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)p = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) if manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53)				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		34		(42)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		•	_4			\/-		(OF NI)	. 00				I	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										se target o		.79		(43)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)_1_0 = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)_1_0 = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (52) Temperature factor from Table 2b (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	not more that 125	litres per p	person pei	day (all w	ater use, l	hot and co	ld)							
(44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)_1 = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)_1 = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b (a) (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (1.03 (52) x (53) = 1.03 (54)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Total = Sum(44)	Hot water usage i	in litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		_
Total = Sum(45) ₁₂	Energy content of	f hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			. ,		1077.45	(44)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
(46)me 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)		·								Total = Su	m(45) ₁₁₂ =		1412.71	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03		ı											I	
Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	` '		19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54)	_) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel)		(47)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54)	•	, ,		•			_							` '
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (48) (49) (49) (50) (51) (51) (52) (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (54)	Otherwise if no	o stored	hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (49) (49) (49) (49) (49) (50) (51) (51) (52) (52) (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (54)	_												ı	
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03					or is kno	wn (kVVI	n/day):)		, ,
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	•										()		, ,
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (51) (52) (53)	• • •		-	-		or is not		(48) x (49)) =		1	10		(50)
Volume factor from Table 2a	•			-							0.	02		(51)
Temperature factor from Table 2b	•	•		on 4.3										
Energy lost from water storage, kWh/year $ (47) \times (51) \times (52) \times (53) = 1.03 $ (54)				O.b.							——			
	·							(47) (7:1)	(FC) :	5 0)	0	.6		
1.03	•		_	, KVVh/ye	ear			(47) x (51)	x (52) x (53) =				
	<u> </u>	, - , , , , (,								1.	00		(00)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•			•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			i	1	l	
· /	"=."	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calcular (see 140.43) m in calcular (see 140.43) s (calcular 40.89) m ins (calcular 140.89)	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances ga (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
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include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See 140.43) Feb 140.43 S (Calculations (culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. e	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
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include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. etc. (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Ins. (Table Ins. (Table Ins. (Table Ins. (Table Ins. Ins. (Table Ins. Ins. Ins. Ins. Ins. Ins. Ins. Ins.	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

											_					_
Southwest _{0.9}	0	x	0.6	S5	X	10	04.39			0.24	X	0.7	=		7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	9	2.85			0.24	X	0.7	-		59.56	(79)
Southwest _{0.9}	0.77	x	0.6	35	x	9	2.85			0.24	X	0.7	=	:	7.03	(79)
Southwest _{0.9}	0.77	×	5.5	51	x	6	9.27]		0.24	X	0.7	=		44.43	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x [6	9.27]		0.24	X	0.7	=		5.24	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	4	4.07			0.24	X	0.7	=		28.27	(79)
Southwest _{0.9}	0.77	x	0.6	35	x	4	4.07			0.24	x	0.7	=	:	3.34	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	3	1.49			0.24	X	0.7	-		20.2	(79)
Southwest _{0.9}	0.77	X	0.6	35	x [3	1.49			0.24	×	0.7			2.38	(79)
					-									'		
Solar gains i	n watts, c	alculated	I for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	18.23	234.64	196	.79	151.24	96.8	55.44	38.05			(83)
Total gains -	internal a	and solar	· (84)m =	= (73)m	+ (8	33)m	, watts					_				
(84)m= 622.7	9 656.94	684.4	712.62	729.21	71	10.09	679.62	649	.56	621.77	598.6	4 592.15	601.12	2		(84)
7. Mean int	ernal tem	perature	(heating	season)											
Temperatui			, ,		<i>'</i>	area f	from Tal	ole 9,	, Th	1 (°C)					21	(85)
Utilisation fa	•	•			-					,						
Jan	T	Mar	Apr	May	r	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	;		
(86)m= 0.99	0.98	0.96	0.9	0.77	0).57	0.41	0.4	-	0.69	0.91	0.98	0.99			(86)
Mean interr	al tempe	ature in	living ar	aa T1 (fo	الد	w sta	ns 3 to 7	7 in T	ahle	9c)			•			
(87)m= 20.34	 	20.6	20.8	20.94	_	0.99	21	2	$\overline{}$	20.98	20.82	20.56	20.32	\neg		(87)
` ′				l				<u> </u>								` '
Temperatur (88)m= 20.17		20.17	eriods ir 20.18	20.18	_	eiiing 20.2	20.2	20.		20.19	20.18	20.18	20.18	\neg		(88)
(88)m= 20.17	20.17	20.17	20.10	20.10		20.2	20.2	20.	.2	20.19	20.10	20.16	20.10			(00)
Utilisation fa		1		· · ·			·	<u> </u>						_		
(89)m= 0.98	0.97	0.95	0.88	0.72	(0.5	0.34	0.3	37	0.62	0.88	0.97	0.99			(89)
Mean interr	al tempe	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_		
(90)m= 19.3	19.44	19.67	19.96	20.13	20	0.19	20.2	20.	.2	20.18	19.99		19.28			(90)
										f	LA = Li	ving area ÷ (4) =		0.26	(91)
Mean interr	al tempe	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2						
(92)m= 19.57	19.7	19.91	20.18	20.34	2	20.4	20.41	20.4	41	20.39	20.21	19.87	19.55			(92)
Apply adjus	tment to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate					
(93)m= 19.57	19.7	19.91	20.18	20.34	2	20.4	20.41	20.4	41	20.39	20.21	19.87	19.55			(93)
8. Space he	eating req	uirement														
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m	=(76)m an	d re-ca	lculate		
the utilisation	1			1			Ι	г.				 		_		
Jan		Mar	Apr	May	<u> </u>	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	<u>; </u>		
Utilisation for (94)m= 0.98	0.97	0.95	0.88	0.73).52	0.36	0.3	<u>, </u>	0.64	0.88	0.96	0.98			(94)
Useful gain				<u> </u>).JZ	0.30	0.5	9	0.04	0.00	0.90	0.90			(04)
(95)m= 610.6	1	647.51	624.44	533.14	36	89.15	243.92	255	.84	395.74	527.3	4 570.3	591.24	1		(95)
Monthly ave				l .	<u> </u>						02.10	. 0.0.0	1 00			(==)
(96)m= 4.3	4.9	6.5	8.9	11.7	_	4.6	16.6	16.	.4	14.1	10.6	7.1	4.2			(96)
Heat loss ra				<u> </u>			<u> </u>						<u> </u>			•
(97)m= 1019.5		890.14	737.34	563.16	_	72.11	244.15	256	_ т	405.7	626.1	837.01	1012.4	7		(97)
	_							L	!							

Space heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 304.21	233.35	180.52	81.29	22.33	0	0	0	0	73.52	192.03	313.39		
							Tota	l per year	(kWh/yea	r) = Sum(9	98)15,912 =	1400.63	(98)
Space heating	g require	ement in	kWh/m²	²/year								18.91	(99)
8c. Space co	oling red	quiremen	nt										
Calculated for	r June, c	July and	August.	See Tal	ble 10b					1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate (100)m= 0	e Lm (ca l 0	liculated 0	using 2	5°C inter	nal temp 602.87	perature 474.6	485.89	ernal ter	nperatur 0	e from 1	able 10)		(100)
Utilisation fac			0		002.07	474.0	403.09	0	0				(100)
(101)m = 0	0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
Useful loss, h	nmLm (V	vatts) = ((100)m >	ι ‹ (101)m	<u>!</u>	ļ				ļ			
(102)m= 0	0	0	0	0	566.25	462.49	468.37	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)		•			
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space cooling set (104)m to	•				dwelling,	continu	ous (kW	'h) = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
(104)m = 0	0	0	0	0	133.74	191.02	159.52	0	0	0	0		
` ′			Į	ļ	ļ	ļ		Tota	l = Sum(104)	<u>-</u>	484.28	(104)
Cooled fractio	n							f C =	cooled	area ÷ (4	4) =	0.6	(105)
Intermittency f				1	1	1				1	_		
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0 Tota	0	(104)	0		7(400)
Space cooling	requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	rota	I = Sum(104)	= [0	(106)
(107)m = 0	0	0	0	0	20.09	28.69	23.96	0	0	0	0		
	•							Tota	l = Sum((1,0,7)	=	72.75	(107)
Space cooling	requirer	ment in k	(Wh/m²/	year				(107)) ÷ (4) =		Ī	0.98	(108)
9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme)							
This part is us										unity scl	heme.		_
Fraction of spa	ace heat	from se	condary	/supplen	nentary l	heating ((Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system/	1 – (30	1) =						1	(302)
The community se									up to four	other heat	sources; th	e latter	
includes boilers, I Fraction of hea				aste neat i	rom powei	r stations.	See Appei	naix C.			Г	0.13	(303a
Fraction of co			•	ouroo 2							L		(303b
	•								40	> (0.87	=
Fraction of total	al space	heat fro	m Comr	nunity C	HP				(3	02) x (303	Ba) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	8b) =	0.87	(304b
Factor for con	trol and	charging	method	l (Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m				Γ	1.05	(306)
Space heatin	g										_	kWh/yea	 r
Annual space	_	requiren	nent									1400.63	
Space heat fro	om Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	= Γ	191.19	(307a)
											L		

				_
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1279.47	(307b)
Efficiency of secondary/supplementary hea	ting system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary	//supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating				7
Annual water heating requirement If DHW from community scheme:			2063.55	
Water heat from Community CHP		(64) x (303a) x (305) x (306) =	281.67	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e	9)] = 36.37	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling sys	stem, if not enter 0)	= (107) ÷ (314) =	15.4	(315)
Electricity for pumps and fans within dwellir mechanical ventilation - balanced, extract of		e	158.57	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix	L)		325.25	(332)
10b. Fuel costs – Community heating sche	eme			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP			£/year	(340a)
Space heating from CHP Space heating from heat source 2	kWh/year	(Table 12)	£/year 01 = 5.68	(340a) (340b)
,	kWh/year (307a) x	(Table 12)	£/year 01 = 5.68 01 = 54.25	
Space heating from heat source 2	kWh/year (307a) x (307b) x	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37	(340b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03	(340b) (342a) (342b) (348)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92	(340b) (342a) (342b) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9	(340b) (342a) (342b) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating schell Energy cost deflator (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120 334.07	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating schell Energy cost deflator (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120 334.07	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost Inb. SAP rating - Community heating school Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12) 12b. CO2 Emissions – Community heating	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 340a)(342e) + (345)(354) = eme	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120 334.07	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357) (358)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating school Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 340a)(342e) + (345)(354) = eme	(Table 12) 2.97	£/year 01 = 5.68 01 = 54.25 01 = 8.37 01 = 79.93 01 = 2.03 01 = 20.92 01 = 42.9 120 334.07	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357)

		Energy kWh/year	Emission factor kg CO2/kWh	r Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	303.47 ×	0.22	65.55	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	92.86 ×	0.52	-48.2	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) to	o (366) for the second fu	uel 96.7	(367b)
CO2 associated with heat source 2	[(307)	o)+(310b)] x 100 ÷ (367b) x	0.22	706.86	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 18.88	(372)
Total CO2 associated with commu	nity systems	(363)(366) + (368)(37	72)	= 768.66	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	nmersion heater or instanta	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		768.66	(376)
CO2 associated with space cooling	9	(315) x	0.52	= 7.99	(377)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52	= 82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 168.8	(379)
Total CO2, kg/year	sum of (376)(382) =			1027.76	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			13.88	(384)
El rating (section 14)				00.40	
J . ,				88.43	(385)
13b. Primary Energy – Community	heating scheme				
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme			30.6](361)
13b. Primary Energy – Community	heating scheme	Energy	Primary	30.6	
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor	30.6](361)
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =		•	30.6 63 P.Energy](361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor	30.6 63 P.Energy kWh/year	(361) (362)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year	factor 1.22	30.6 63 P.Energy kWh/year	(361) (362) (363)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = −(307a) × (361) ÷ (362) =	kWh/year 303.47 X 92.86 X	1.22 3.07	30.6 63 P.Energy kWh/year 370.23 -285.09	(361) (362) (363) (364)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	303.47 X 92.86 X 447.1 X	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02	(361) (362) (363) (364) (365)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 303.47 × 92.86 × 447.1 × 136.81 ×	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02	(361) (362) (363) (364) (365) (366)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	303.47 X 92.86 X 447.1 X 136.81 X Sing two fuels repeat (363) to	1.22 3.07 1.22 3.07 0 (366) for the second fu	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02 uel 96.7	(361) (362) (363) (364) (365) (366) (367b)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	303.47 X 92.86 X 447.1 X 136.81 X Sing two fuels repeat (363) to (367b) x (367b) x	1.22 3.07 1.22 3.07 0 (366) for the second function of the secon	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02 uel 96.7 = 3992.47	(361) (362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems	kWh/year 303.47	1.22 3.07 1.22 3.07 0 (366) for the second function (366) for	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02 July 96.7 = 3992.47 = 111.67	(361) (362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comments	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) nunity systems (unless specified otherwise)	kWh/year 303.47	1.22 3.07 1.22 3.07 0 (366) for the second function (366) for	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02 Jel 96.7 = 3992.47 = 111.67 = 4314.74	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with committee if it is negative set (373) to zero	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) nunity systems (unless specified otherwise ting (secondary)	303.47 X 92.86 X 447.1 X 136.81 X Sing two fuels repeat (363) to (313) X (363)(366) + (368)(376) X X X X X X X X X	1.22 3.07 1.22 3.07 0 (366) for the second function of the secon	30.6 63 P.Energy kWh/year 370.23 -285.09 545.46 -420.02 Jel 96.7 = 3992.47 = 111.67 = 4314.74 4314.74	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)

Total Primary Energy, kWh/year	sum of (376)(382) =				5847.32	(383)
Energy associated with electricity for lighting	(332))) x		3.07	=	998.51	(379)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	486.81	(378)
Energy associated with space cooling	(315) x		3.07	=	47.27	(377)

		User De	etails:						
Assessor Name:	Chris Hocknell			a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012			are Vei				n: 1.0.4.10	
		Property A	Address	Flat 2-2	2-Clean				
Address :									
1. Overall dwelling dime	ensions:								
Danamant		Area	• •			ight(m)	٦,, ١	Volume(m ³	_
Basement			6.06	(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 76	6.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry (other		total			m³ per hou	r
Number of chimneys	0 + 0	+ [0] = [0	X ·	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent fa	ins			, <u> </u>	0	x	10 =	0	(7a)
Number of passive vents	3			Ē	0	x	10 =	0	(7b)
Number of flueless gas f	ires			F	0	x	40 =	0	(7c)
				L					`
							Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$	(7a)+(7b)+(7	7 c) =	Γ	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce	ed to (17), o	therwise o	continue fr	om (9) to	(16)	,		_
Number of storeys in the Additional infiltration	he dwelling (ns)					[(0)	11v0 1 -	0	(9)
	.25 for steel or timber frame o	r 0 35 for	masoni	v constr	ruction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corresponding			•	dollon			0	(''')
deducting areas of opening	= : :) 4 (a a a la c	-I\ -I						¬
•	floor, enter 0.2 (unsealed) or (J.1 (seale	a), eise	enter U				0	(12)
If no draught lobby, en	s and doors draught stripped							0	(13)
Window infiltration	s and doors draught stripped	(0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate					2) + (13)	+ (15) =		0	(16)
	q50, expressed in cubic metr						area	3	(17)
•	lity value, then $(18) = [(17) \div 20] +$	-	•	•				0.15	(18)
·	es if a pressurisation test has been do				is being u	sed			
Number of sides sheltered	ed							3	(19)
Shelter factor				[0.075 x (1	(9)] =			0.78	(20)
Infiltration rate incorpora		((21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified f		1 1				T		1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp						1	1	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
				<u> </u>				ı	

0.15	ation rate	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1		
alculate effec		_	rate for t	he appli	cable ca	ise	ļ		ļ			J 		_
If mechanica				(. (00)	\ (22.\				0.5	(2:
If exhaust air he) = (23a)				0.5	(23
If balanced with		-	-	_									76.5	(2:
a) If balance			1	i		- 	- 	í `	r Ó - Ò		- `) ÷ 100] 7		(2
4a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J		(2
b) If balance			1	i	1		, 	ŕ	r Ó		Ι .	7		(2
(4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse ext n < 0.5 ×			•	•				5 v (23h	.\				
4c)m = 0	0.5 x	0	0	0 = (231)		0	$\frac{1}{1} = (221)$	0	0	0	0	1		(2
d) If natural												J		_
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
Effective air	change i	rate - er	 nter (24a) or (24l	b) or (24	c) or (24	ld) in bo	x (25)	•		•	-		
5)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	1		(2
B. Heat losses	s and ha	at loss r	narameti	or.	•							_		
LEMENT	Gros	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
	0.00												, ,	
	area	(m²)	m		Α,ι		W/m2		(W/ł	<)	kJ/m²-		kJ	J/K
oors	area ((m²)								<) 			kJ	J/K
		(m²)			1, A	m² x	W/m2	2K =	(W/ł	<) 			kJ	J/K (2
indows Type	: 1	(m²)			A ,ı	m ² x	W/m2	2K = 	(W/ł 3.12	<) 			kJ	J/K (2 (2
indows Type indows Type	e 1 e 2	(m²)			A ,ı 2.6	m ² x x1 x1	W/m2 1.2 /[1/(1.2)+	eK = 0.04] = 0.04] =	3.12 3.73	<) 			kJ	J/K (2 (2
indows Type indows Type indows Type	e 1 e 2 e 3	(m²)			A ,1 2.6 3.26 3.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	eK = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<)			k J	J/K (2 (2 (2
indows Type indows Type indows Type indows Type	2 2 3 4			<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	<)			kJ	J/K (; (; (; (;
indows Type indows Type indows Type indows Type alls Type1	2 2 3 4 38.14	4	20.58	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74 2.63				kJ	J/K (2 (2 (2 (2 (2
oors findows Type findows Type findows Type findows Type falls Type1 falls Type2	2 2 3 3 4 4 38.14 23.92	4 2	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2	<>			kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	23.92 3.14 23.92 5.95	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type3 alls Type4	38.14 23.92 5.95 29.5	4 2 5	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2				kJ	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
findows Type findows Type findows Type findows Type falls Type1 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 21.32 5.95 29.5	m² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.57 12.38	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	
indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 5.95 29.52	4 2 5 1 , m ²	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 = 0.04 = 0.04 = = = = = = =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	K	kJ	//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area	23.92 23.92 23.92 23.92 29.52 29.52 29.52 29.52 29.52	4 2 5 1 , m ² ows, use e	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of the second	EK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	23.92 38.14 23.92 5.95 29.57 29.57 29.67 29.	4 2 1 1 , m ² ows, use e sides of in = S (A x	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	as given in	kJ/m²-	h 3.2	7.84	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 23.92 29.57 29	4 2 1 1 , m ² ows, use e sides of in = S (A x A x k)	20.58 2.6 0 0 orderective with the internal walk	8 8 Indow U-vi	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.33 5.95 12.38 76.06 76.06 alue calculatitions	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of the second	PK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2

	at loss							(33) +	(36) =			48.84	(3
entilation hea	at loss ca	alculated	l monthly	/		ı	1	(38)m	= 0.33 × ((25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat transfer	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m= 66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		
									•	Sum(39) ₁ .	12 /12=	64.8	(3
eat loss para	- `						I		= (39)m ÷	<u> </u>	1		
0.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84	0.84	0.85	0.86	0.86		— ,
umber of day	ys in mor	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	0.85	(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
						<u>l</u>	<u> </u>		l .	<u> </u>			
1. Water hea	ting ener	gy requi	rement:								kWh/ye	ear:	
	<u> </u>												
ssumed occu if TFA > 13.			[4 0)(0)	(0 0003	40 v /T	-A 12.0°	\2\1 · 0 ()012 v (TEA 10		38		(
ii 1FA > 13. if TFA £ 13.		+ 1.76 X	[ı - exp	(-0.0003	49 X (11	-A -13.9)2)] + 0.0) X C I U	IFA -13.	.9)			
nual averaç	•	ater usad	ge in litre	s per da	ıv Vd,av	erage =	(25 x N)	+ 36		90	.82		(
duce the annu									se target o		.02		`
t more that 125	litres per p	person per	day (all w	ater use, I	not and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usage i	in litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
1)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
	•									m(44) ₁₁₂ =	L	1089.8	
		used cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor	nth (see Ta	shlac 1h 1	c, 1d)		
ergy content of	f hot water	useu - car								, , , , , , , , , , , , , , , , , , ,			
, ——	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
5)m= 148.15	129.57	133.7	116.57				102.63	103.86	121.03	· ·		1428.9	
i)m= 148.15	129.57 vater heatir	133.7 ng at point	116.57 of use (no	hot water	storage),	enter 0 in	102.63 boxes (46,	103.86) to (61)	121.03 Total = Su	132.12 m(45) ₁₁₂ =	=	1428.9	
5) m = 148.15 $nstantaneous v$ $5) m = 22.22$	129.57 vater heatir 19.44	133.7	116.57				102.63	103.86	121.03	132.12		1428.9	
isim= 148.15 instantaneous v isim= 22.22 ater storage	129.57 vater heatin 19.44 loss:	133.7 ng at point 20.06	116.57 of use (no	hot water	storage), 14.48	enter 0 in 13.42	102.63 boxes (46) 15.39	103.86) to (61) 15.58	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	(
isi)m= 148.15 instantaneous v isi)m= 22.22 ater storage orage volum	129.57 vater heatin 19.44 loss: ne (litres)	133.7 ng at point 20.06 includir	116.57 of use (no. 17.48) ag any so	hot water 16.78 Dlar or W	storage), 14.48 /WHRS	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa	103.86) to (61) 15.58	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	=	1428.9	(
5)m= 148.15 nstantaneous v 6)m= 22.22 ater storage orage volum community h	129.57 vater heatin 19.44 loss: ne (litres) neating a	133.7 ng at point 20.06 includin nd no ta	of use (no 17.48 ag any so nk in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	(
5)m= 148.15 nstantaneous v 6)m= 22.22 eater storage eorage volum community h therwise if ne	129.57 vater heatin 19.44 loss: ne (litres) neating a o stored	133.7 ng at point 20.06 includin nd no ta	of use (no 17.48 ag any so nk in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	
5)m= 148.15 nstantaneous v 6)m= 22.22 ater storage orage volum community h therwise if ne	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored	133.7 ang at point 20.06 includin ind no ta hot wate	of use (no 17.48 ag any so nk in dw er (this in	o hot water 16.78 Dlar or W relling, e	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
instantaneous voices ater storage volume community herwise if neater storage of the storage of t	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's de	133.7 ag at point 20.06 includin ind no ta hot wate	of use (not) 17.48 ag any so ank in dwer (this in oss factors)	o hot water 16.78 Dlar or W relling, e	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v 22.22 ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum	129.57 vater heatir 19.44 loss: ne (litres) neating a constored loss: turer's defactor from	133.7 ang at point 20.06 includin and no ta hot wate eclared le	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b	o hot water 16.78 Dlar or W relling, e reludes i	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
nstantaneous v nstantaneous v s)m= 22.22 ater storage orage volum community h therwise if neater storage) If manufact emperature f nergy lost from	129.57 vater heatin 19.44 loss: ne (litres) neating a constored closs: turer's defactor from water	133.7 ang at point 20.06 including and no tale to the water of the colored leading at the	of use (not) 17.48 ag any so ank in dwer (this in oss factor) 2b , kWh/ye	o hot water 16.78 Dlar or W relling, e reludes i	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
instantaneous v instantaneous	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's defactor from water turer's defactor from	133.7 ang at point 20.06 includir and no ta hot wate eclared le m Table storage eclared of	of use (not) 17.48 ag any so onk in dwer (this in oss factor 2b , kWh/ye cylinder I	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	()
instantaneous v instantaneous	129.57 vater heatin 19.44 19.44 loss: ne (litres) neating a constored stored stored factor from water turer's deage loss neating s	133.7 ng at point 20.06 includin and no ta hot wate eclared le m Table storage eclared of	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b , kWh/ye cylinder I com Tabl	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	()
instantaneous v instantaneous	129.57 vater heating 19.44 no stored loss: turer's defactor from water turer's deage loss neating safe from Tal	133.7 ang at point 20.06 includin and no ta hot wate eclared le storage eclared of factor fr ee section	of use (not) 17.48 ag any so ank in dwer (this in) 0ss factor 2b 4, kWh/ye cylinder I om Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	
instantaneous v instantaneous	129.57 vater heating 19.44 no stored loss: turer's defactor from water turer's deage loss neating safe from Tal	133.7 ang at point 20.06 includin and no ta hot wate eclared le storage eclared of factor fr ee section	of use (not) 17.48 ag any so ank in dwer (this in) 0ss factor 2b 4, kWh/ye cylinder I om Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82 47)	21.52 0 0 0 10	1428.9	
instantaneous v	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's de factor from turer's de rage loss neating s from Tal	133.7 ang at point 20.06 includir and no ta hot wate eclared le m Table storage eclared of factor fr ee section ble 2a m Table	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b , kWh/ye cylinder I com Table on 4.3	o hot water 16.78 Diar or W relling, e rellings i or is kno ear oss factor e 2 (kW)	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 0 to (61) 15.58 ame vesters) enter	121.03 Total = Sul 18.16 sel er '0' in (132.12 m(45) ₁₁₂ = 19.82 47)	21.52 0 0 0 10 02	1428.9	

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	55 × (41)	m				l	
(modified by				•	,	` '	` '		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	r heating)		
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter	-		-	-		-		-			
(64)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
		!					Outp	out from wa	ater heate	r (annual)₁	12	2079.74	(64)
Heat gains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	_
(65)m= 93.48	83.02	88.68	81.55	81.41	74.89	73.96	<u> </u>	_		<u> </u>	<u> </u>	·	(65)
			01.00	01.41	14.03	73.90	78.35	77.33	84.47	86.72	91.93		(65)
include (57)	m in cal		<u> </u>		<u> </u>	<u> </u>				<u> </u>		eating	(03)
include (57) 5. Internal q		culation o	of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i:	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(66)
5. Internal g Metabolic gain Jan	ains (see ns (Table Feb 143.03	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 143.03	only if constant of the consta	Jun 143.03	Jul 143.03	Aug 143.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 143.03	ains (see ns (Table Feb 143.03	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 143.03	only if constant of the consta	Jun 143.03	Jul 143.03	Aug 143.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03	res (Table Feb 143.03 (calcula 41.77	E Table 5 E 5), Wat Mar 143.03 ted in Ap 33.97	of (65)m 6 and 5a ts Apr 143.03 opendix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	Jul 143.03 r L9a), a	Aug 143.03 Iso see	Sep 143.03 Table 5 30.6	Oct 143.03	Nov	Dec 143.03	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains	res (Table Feb 143.03 (calcula 41.77	E Table 5 E 5), Wat Mar 143.03 ted in Ap 33.97	of (65)m 6 and 5a ts Apr 143.03 opendix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	Jul 143.03 r L9a), a	Aug 143.03 Iso see	Sep 143.03 Table 5 30.6	Oct 143.03	Nov	Dec 143.03	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21	culation of Table 5 (a) Wat Mar 143.03 (b) 143.97 (c) 1	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if construction in the construction in th	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	Aug 143.03 lso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11	Nov 143.03	Dec 143.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21	culation of Table 5 (a) Wat Mar 143.03 (b) 143.97 (c) 1	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if construction in the construction in th	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	Aug 143.03 lso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11	Nov 143.03	Dec 143.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21 s (calcula 51.69	culation of Table 5 2 5), Wat Mar 143.03 ted in Ap 33.97 culated in 309.97 ated in A 51.69	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 n Append 292.44 opendix 51.69	only if controls: May 143.03 L, equati 19.22 dix L, equati 270.31 L, equati	Jun 143.03 ion L9 of 16.23 uation L 249.51 ion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a)	Aug 143.03 Iso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11 5	Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21 s (calcula 51.69	culation of Table 5 2 5), Wat Mar 143.03 ted in Ap 33.97 culated in 309.97 ated in A 51.69	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 n Append 292.44 opendix 51.69	only if controls: May 143.03 L, equati 19.22 dix L, equati 270.31 L, equati	Jun 143.03 ion L9 of 16.23 uation L 249.51 ion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a)	Aug 143.03 Iso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11 5	Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa	res (Table Feb 143.03 (calcula 41.77 sins (calcula 51.69 ns gains 0	culation of the culation of th	of (65)m 5 and 5a ts Apr 143.03 ppendix 25.72 Appendix 292.44 ppendix 51.69 5a) 0	only if construction only if c	Jun 143.03 ion L9 of 16.23 uation L 249.51 cion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 lso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0	res (Table Feb 143.03 (calcula 41.77 sins (calcula 51.69 ns gains 0	culation of the culation of th	of (65)m 5 and 5a ts Apr 143.03 ppendix 25.72 Appendix 292.44 ppendix 51.69 5a) 0	only if construction only if c	Jun 143.03 ion L9 of 16.23 uation L 249.51 cion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 lso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 143.03 (calcula 41.77 tins (calcula 51.69 ns gains 0 vaporatio -95.35	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 143.03 ppendix 25.72 Append 292.44 ppendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 0 16.23 uation L 249.51 ion L15 51.69 0	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35	res (Table Feb 143.03 (calcula 41.77 tins (calcula 51.69 ns gains 0 vaporatio 95.35 gains (Table Feb 143.03 (calcula 151.69 ns gains (Table Feb 143.03 (ca	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 143.03 ppendix 25.72 Append 292.44 ppendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 0 16.23 uation L 249.51 ion L15 51.69 0	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35 Water heating	res (Table Feb 143.03 (calcula 41.77 tims (calcula 51.69 ms gains 0 vaporatio 123.55	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of	of (65)m of and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 o tive valu -95.35	only if constructions only if constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69 0	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69 0 -95.35	Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	Nov 143.03 45.34 280.24 51.69 0	Dec 143.03 48.34 301.04 51.69 0	eating	(66) (67) (68) (69) (70)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35 Water heating (72)m= 125.65	res (Table Feb 143.03 (calcula 41.77 tims (calcula 51.69 ms gains 0 vaporatio 123.55	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe	of (65)m c and 5a ts Apr 143.03 ppendix 25.72 Appendix 292.44 ppendix 51.69 c a) 0 tive valu -95.35	only if constructions only if constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69 0	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69 0 -95.35	Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	Nov 143.03 45.34 280.24 51.69 0	Dec 143.03 48.34 301.04 51.69 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	х	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25		0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

	_								. –						_		_
Southw	est _{0.9x}	0.77	X	0.6	65	X	1	04.39	L		0.24	x	0.7		= <u>[</u>	7.9	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	х	0.7	:	= [59.56	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	X	9	2.85			0.24	x	0.7	:	= [7.03	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	x	6	9.27			0.24	x	0.7	:	= [44.43	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	6	9.27			0.24	x	0.7	:	= [5.24	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	x	0.7	:	= [28.27	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	4	4.07			0.24	x	0.7	:	= [3.34	(79)
Southw	est _{0.9x}	0.77	x	5.5	51	x	3	1.49			0.24	x	0.7		<u> </u>	20.2	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	3	1.49			0.24	x	0.7		<u> </u>	2.38	(79)
	_								_								_
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m :	= Su	m(74)m .	(82)m					
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.7	79	151.24	96.8	55.44	38.05	5		(83)
Total g	ains – iı	nternal a	and solar	(84)m =	= (73)m -	+ (8	33)m	, watts					_	_			
(84)m=	632.31	666.4	693.47	721.08	737.03	7′	17.34	686.56	656.	6	629.18	606.65	600.84	610.3	5		(84)
7. Me	an inter	nal temp	perature	(heating	season)											
Temp	erature	during h	neating p	eriods ir	n the livii	ng :	area t	from Tab	ole 9,	Th1	(°C)				Γ	21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	ea, h1,m	(se	ee Ta	ble 9a)			` ,				L		
	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Au	g	Sep	Oct	Nov	De	С		
(86)m=	0.99	0.98	0.96	0.9	0.76	(0.56	0.41	0.44	1	0.68	0.91	0.97	0.99			(86)
Mean	interna	l temner	ature in l	living ar	22 T1 (fc	مااه	w sta	ns 3 to 7	in Ts	ahle	9c)						
(87)m=	20.37	20.47	20.62	20.82	20.95	_	0.99	21	21	$\overline{}$	20.98	20.84	20.58	20.35	5		(87)
			<u> </u>														` ,
· 1	erature 20.19	auring r	eating p	erioas ir 20.21	20.21	_	eiiing 0.22	20.22	20.2	$\overline{}$	20.22	20.21	20.21	20.2	\neg		(88)
(88)m=			<u> </u>								20.22	20.21	20.21	20.2			(00)
ı			ains for r			_	<u> </u>		9a)						_		
(89)m=	0.98	0.97	0.95	0.87	0.71		0.5	0.34	0.37	7	0.61	0.88	0.97	0.99			(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng	T2 (f	ollow ste	ps 3 1	to 7	in Tabl	e 9c)					
(90)m=	19.37	19.51	19.73	20.01	20.16	2	0.22	20.22	20.2	2	20.2	20.04	19.69	19.35	5		(90)
											f	LA = Livir	ng area ÷ (4	4) =		0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1 –	- fL/	A) × T2						
(92)m=	19.63	19.75	19.96	20.22	20.37	_	0.42	20.42	20.4	-	20.4	20.24	19.92	19.61			(92)
Apply	adjustn	nent to t	he mean	internal	temper	atu	re fro	m Table	4e, w	vher	re appro	priate					
(93)m=	19.63	19.75	19.96	20.22	20.37	2	0.42	20.42	20.4	2	20.4	20.24	19.92	19.61			(93)
8. Spa	ace hea	ting requ	uirement														
			ernal ter	•		ed	at ste	ep 11 of	Table	9b	, so tha	t Ti,m=(76)m an	d re-ca	alc	ulate	
the ut		1	or gains u			_				_			1	Ι	_		
Liera	Jan	Feb	Mar	Apr	May		Jun	Jul	Au	g	Sep	Oct	Nov	De	С		
i	0.98	o.97	ains, hm _{0.95}		0.72	_	. 51	0.25	0.20	$\overline{}$	0.62	0.88	0.06	0.00	\neg		(94)
(94)m=				0.87			0.51	0.35	0.39	<u>, </u>	0.63	0.00	0.96	0.98			(34)
(95)m=	619.92	646.73	, W = (94 655.34	629.43	533.92	36	 58.11	243.17	255.	1	395.47	532.19	578.3	600.3	1		(95)
			rnal tem			L		2 10.17	200.	<u>' </u>	JUJ†1	552.15	1 37 3.3	1 300.5			(55)
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.4	ı T	14.1	10.6	7.1	4.2			(96)
			an intern					<u> </u>					<u> </u>	<u> </u>			
(97)m=	1014.49		885.73	733.89	560.3		70.53	243.35	255.4		403.9	623.51	833.54	1008.0)2		(97)
` '								L									

Space heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 293.56	224.07	171.41	75.21	19.62	0	0	0	0	67.94	183.77	303.34		_
							Tota	l per year	(kWh/year	r) = Sum(9	08)15,912 =	1338.92	(98)
Space heatin	g require	ement in	kWh/m²	²/year								17.6	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo					ble 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	e Lm (ca	liculated 0	using 2	o inter	598.91	erature 471.48	482.78	ernal ter	nperatur 0	e from 1	able 10)		(100)
Utilisation fac			0		390.91	471.40	402.70	0		0			(100)
(101)m= 0	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
Useful loss, h	ımLm (V	Vatts) = ((100)m >	ι ‹ (101)m		ļ				<u> </u>			
(102)m= 0	0	0	0	0	566.6	461.21	467.74	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	•	•			
(103)m= 0	0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
Space cooling set (104)m to	• .				dwelling,	continu	ous (kW	h') = 0.0)24 x [(10	03)m – (102)m]x	(41)m	
(104)m = 0	0	0	0	0	138.71	197.13	165.24	0	0	0	0		
(101)								<u> </u>	l = Sum(=	501.07	(104)
Cooled fraction	n								cooled	,	4) =	0.59	(105)
Intermittency f	actor (Ta	able 10b)										_
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		- 1
Space cooling	roquiror	mont for	month -	. (104)m	× (105)	v (106)r	m	l ota	I = Sum((104)	= [0	(106)
(107)m= 0	0	0	0	0	20.29	28.83	24.17	0	0	0	0		
` ′								 Tota	I I = Sum(107)	=	73.29	(107)
Space cooling	requirer	ment in k	(Wh/m²/	year) ÷ (4) =		ř	0.96	(108)
9b. Energy red	•				scheme)			, , ,		L		
This part is us	•		· ·	Ŭ			ting prov	ided by	a comm	unity scl	neme		
Fraction of spa	ace heat	from se	condary	/supplen	nentary l	heating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	/ system	1 – (30	1) =					Γ	1	(302)
The community so includes boilers, h									up to four	other heat	sources; the	e latter	
Fraction of hea	at from C	Commun	ity CHP		·						Γ	0.13	(303a
Fraction of cor	nmunity	heat fro	m heat s	source 2							Ī	0.87	(303b
Fraction of total	al space	heat fro	m Comr	nunity C	HP				(3	02) x (303	(a) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	eat sourc	e 2			(3	02) x (303	(sb) =	0.87	(304b
Factor for cont	trol and	charging	method	l (Table	4c(3)) fo	r comm	unity hea	nting sys	tem		Ī	1	(305)
Distribution los	ss factor	(Table 1	2c) for (commun	ity heati	ng syste	m				Ī	1.05	(306)
Space heating	g										_	kWh/yea	 r
Annual space	heating	requiren	nent									1338.92	
Space heat fro	om Comi	munity C	HP					(98) x (3	04a) x (30	5) x (306)	- [182.76	(307a)
											_		

			_		_
Space heat from heat source 2		(98) x (304b) x (3	305) x (306) =	1223.1	(307b)
Efficiency of secondary/supplementary heating sy	stem in % (from Tab	e 4a or Append	lix E)	0	(308
Space heating requirement from secondary/supple	ementary system	(98) x (301) x 100	0 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			ĺ	2079.74	
If DHW from community scheme:		(6.4) v (202a) v (2	205) v (206)	222.22	
Water heat from Community CHP		(64) x (303a) x (3	, , , , , <u>, , , , , , , , , , , , , , </u>	283.88	(310a)
Water heat from heat source 2	0.0	(64) x (303b) x (3		1899.84	(310b)
Electricity used for heat distribution	0.0	1 x [(307a)(307e)) + (310a)(310e)] =	35.9	(313)
Cooling System Energy Efficiency Ratio	(, , , , , , , , , , , , , , , , , , ,	(107) (011)	l	4.73	(314)
Space cooling (if there is a fixed cooling system, if	,	= (107) ÷ (314) =	·	15.51	(315)
Electricity for pumps and fans within dwelling (Tab mechanical ventilation - balanced, extract or posit		e	[162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b)	+ (330g) =	162.85	(331)
Energy for lighting (calculated in Appendix L)				332.22	(332)
10b. Fuel costs – Community heating scheme					
	Fuel	Fuel	Dulas	Fuel Cost	
	kWh/year	(Tabl	Price e 12)	£/year	
Space heating from CHP		(Tabl			(340a)
Space heating from CHP Space heating from heat source 2	kWh/year	(Tabl	e 12)	£/year	(340a) (340b)
•	kWh/year (307a) x	(Tabl	(e 12) 2.97 × 0.01 = [£/year	_
Space heating from heat source 2	kWh/year (307a) x (307b) x	(Tabl	2.97 × 0.01 = [4.24 × 0.01 = [£/year 5.43 51.86	(340b)
Space heating from heat source 2 Water heating from CHP	kWh/year (307a) x (307b) x (310a) x	(Table 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	e 12) 2.97	£/year 5.43 51.86 8.43	(340b) (342a)
Space heating from heat source 2 Water heating from CHP	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 2 4 Fuel	x 0.01 = [2.97	£/year 5.43 51.86 8.43	(340b) (342a)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 2 4 Fuel 1:	e 12	£/year 5.43 51.86 8.43 80.55	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 2 4 Fuel 13	e 12)	£/year 5.43 51.86 8.43 80.55	(340b) (342a) (342b) (348)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82	(340b) (342a) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120 333.62	(340b) (342a) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (342e) + (345)(354) =	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120 333.62	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (342e) + (345)(354) =	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120 333.62 0.42 1.16 83.85	(340b) (342a) (342b) (348) (349) (350) (351) (355) (356) (357) (358)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) (342e) + (345)(354) =	(Table 2 4 Fuel 13	e 12	£/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120 333.62 0.42 1.16	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357)

		Energy kWh/year	Emission factoring the Emission factoring factoring the Emission factoring factoring factoring factoring factoring		nissions CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	290.1 ×	0.22	[62.66	(363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	88.77 ×	0.52	[-46.07	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	[97.33	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 ×	0.52	[-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) t	to (366) for the second	d fuel	96.7	(367b)
CO2 associated with heat source 2	2 [(307)	b)+(310b)] x 100 ÷ (367b) x	0.22	= [697.58	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= [18.63	(372)
Total CO2 associated with commu	nity systems	(363)(366) + (368)(3	72)	= [758.56	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= [0	(374)
CO2 associated with water from im	nmersion heater or instanta	aneous heater (312) x	0.22	= [0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =			758.56	(376)
CO2 associated with space cooling	9	(315) x	0.52	= [8.05	(377)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52	= [84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	=	172.42	(379)
Total CO2, kg/year	sum of (376)(382) =				1023.56	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =				13.46	(384)
						_
El rating (section 14)					88.67	(385)
13b. Primary Energy – Community	heating scheme					
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme				30.6	(361)
13b. Primary Energy – Community	heating scheme	Energy	Primary		30.6	
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor		30.6	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =		•		30.6 63 Energy	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor		30.6 63 Energy Vh/year	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year	factor		30.6 63 Energy Vh/year 353.92	(361) (362) (363)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$	290.1 × 88.77 ×	1.22 3.07		30.6 63 Energy Vh/year 353.92 -272.52	(361) (362) (363) (364)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	290.1 × 88.77 × 450.61 ×	1.22 3.07 1.22 3.07	kV [[30.6 63 Energy Vh/year 353.92 -272.52 549.74	(361) (362) (363) (364) (365)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	290.1 × 88.77 × 450.61 × 137.89 ×	1.22 3.07 1.22 3.07	kV [[30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31	(361) (362) (363) (364) (365) (366)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	290.1 × 88.77 × 450.61 × 137.89 × sing two fuels repeat (363) t	1.22 3.07 1.22 3.07 20 (366) for the second	kV	30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31 96.7	(361) (362) (363) (364) (365) (366) (367b)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	xWh/year 290.1 x 88.77 x 450.61 x 137.89 x sing two fuels repeat (363) t b)+(310b)] x 100 ÷ (367b) x	1.22 3.07 1.22 3.07 3.07 50 (366) for the second	kV [30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31 96.7 3940.01	(361) (362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) con munity systems	xWh/year 290.1 x 88.77 x 450.61 x 137.89 x sing two fuels repeat (363) t b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3	1.22 3.07 1.22 3.07 1.22 3.07 1.22 1.22	kV [30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31 96.7 3940.01	(361) (362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comments	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise)	xWh/year 290.1 x 88.77 x 450.61 x 137.89 x sing two fuels repeat (363) t b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3	1.22 3.07 1.22 3.07 1.22 3.07 1.22 1.22	kV [30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31 96.7 3940.01 110.2 4258.04	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise ting (secondary)	290.1 × 88.77 × 450.61 × 137.89 × sing two fuels repeat (363) t b)+(310b)] × 100 ÷ (367b) × [(313) × (363)(366) + (368)(365) + (368)(365) + (368)(366) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (368) + (3	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 72)	kV [30.6 63 Energy Vh/year 353.92 -272.52 549.74 -423.31 96.7 3940.01 110.2 4258.04	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)

Total Primary Energy, kWh/year	sum of (376)(382) =				5825.53	(383)
Energy associated with electricity for lighting	(332))) x		3.07	=	1019.91	(379)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	499.96	(378)
Energy associated with space cooling	(315) x		3.07	=	47.62	(377)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 3-	1-Clean				
Address: 1. Overall dwelling dime	pneione:								
1. Overall awelling unite	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	7 + [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	<u> </u>	0		20 =	0	(6b)
Number of intermittent fa	ins				0	x ′	10 =	0	(7a)
Number of passive vents	;			Ē	0	x	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_				_	
		_	<i>(</i> _)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(peen carried out or is intended, proceed			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(/ , ,			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o irie grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	·							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	P x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.13	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
	• •			_	_	-		-	

0.16	0.16	0.16	ing for sh	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1		
alculate effec	ctive air c	hange	rate for t	he appli	cable ca	ise	<u> </u>		<u> </u>					
If mechanica													0.5	(2
If exhaust air he) = (23a)				0.5	(2
If balanced with		-	-	_									6.5	(2
a) If balance				—	1	- ` ` 	- 	í `	r Ó Ó		- ` `) ÷ 100] ⊓		(2
4a)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	J		(2
b) If balance				i	1	, 	- ^ ` ` - 	ŕ	r Ó		Ι .	1		(2
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse extı ∩ < 0.5 ×			•	•				5 v (23h	.\				
4c)m= 0	0.5 x	0	0	0	0	0	0	0	0	0	0	1		(2
d) If natural												J		
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
Effective air	change r	ate - er	nter (24a) or (24l	o) or (24	c) or (24	ld) in bo	x (25)	•		•	-		
5)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	1		(2
. Heat losses	s and has	at lose r	narameti	ar:								-		
LEMENT	Gross	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
		_	O P 0				•							
	area ((m²)	m) ²	A ,r	n²	W/m2	2K	(W/ł	<)	kJ/m²•	K	kJ	/K
oors	area ((m²)	r	1 ²	A ,r	m² x	W/m2	2K =	(W/ł 3.12	<) 	kJ/m²-	K	kJ	
		(m²)	rr	1 ²		x x		=	`	<) 	kJ/m²•	K	kJ	(:
indows Type	: 1	(m²)	m) ²	2.6	x x1	1.2	= 0.04] =	3.12	<) 	kJ/m²•	K	kJ	(:
indows Type indows Type	e 1 e 2	(m²)	m	12	3.26	x x1 x1	1.2 /[1/(1.2)+	= (0.04] = (0.04] =	3.12	<) 	kJ/m²-	K	kJ	(; (; (;
indows Type indows Type indows Type	2 3	(m²)	m	12	2.6 3.26 3.95	x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<) 	kJ/m²-	K	kJ	(; (; (;
indows Type indows Type indows Type indows Type	2 3		20.58		2.6 3.26 3.95 5.51	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31	<)	kJ/m²-	K	kJ	(1)
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4	3			2.6 3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	\(\) \(kJ/m²-	K	kJ	(1) (1) (2) (2) (3)
indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4 67.78 24.47	3 7	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87	x x1 x1 x1 x1 x1 x1 x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28		kJ/m²-	K	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	67.78 64 67.78 24.47 5.93	3	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93	x x1 x1 x1 x1 x1 x1 x x1 x x1 x x1 x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89		kJ/m²-	K	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72	x x1 x1 x1 x1 x1 x x x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		kJ/m²-	к _ _ _ _	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e arty wall	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e arty wall arty floor	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38	x x1 x1 x1 x1 x1 x x1 x x2 x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and	67.78 67.78 24.47 5.93 19.72 Ilements,	3 7 2 m ² ws, use 6	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculum	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = = 0.04] = = 0.04] = = 0.04] = 0.	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and include the area	24.47 5.93 19.72 1 roof windoons on both s	m ² ws, use e	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculum	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				kJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	24.47 5.93 19.72 19.72 19.72 19.75 19.	m ² ws, use esides of ir: S (A x	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculum	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96	s given in	paragrap	h 3.2	0.89	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e	24.47 5.93 19.72 1ements, 1roof windo as on both ses, W/K = Cm = S(A	m ² m ² ms, use esides of interest in the state of the	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculatitions	x x1 x1 x1 x1 x1 x x x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		paragrap	h 3.2		/K (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3

Total fabric he	-41	aro mot nar	own (36) =	- 0.70 X (0	,			(00)	(0.0)		Г		–
\/antilation ba		alouloto d	manthl						(36) =	25\m v (5\		63.71	(37)
Ventilation hea					luna	ll	۸	` ,	,	25)m x (5)			
(38)m= 17.8	Feb 17.59	Mar 17.39	Apr 16.38	May 16.18	Jun 15.16	Jul 15.16	Aug 14.96	Sep 15.57	Oct 16.18	16.58	Dec 16.99		(38)
` ′			10.36	10.16	15.16	15.16	14.96			<u> </u>	10.99		(30)
Heat transfer of						i		· ,	= (37) + (
(39)m= 81.5	81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		–
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	80.03	(39)
(40)m= 1.1	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.08	1.09		
								,	Average =	Sum(40) ₁ .	12 /12=	1.08	(40)
Number of day	ys in mor	nth (Tabl	e 1a)							1	1		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ener	av requi	rement:								kWh/ye	ar:	
n. Water nea	ung onoi	gy roqui	romont.								icvvii, y c		
Assumed occu											34		(42)
if TFA > 13.		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9))2)] + 0.0	0013 x (¯	ΓFA -13.	.9)			
if TFA £ 13. Annual averag	•	otor ucoc	o in litro	s por do	w Vd av	orago –	(25 v NI)	. 26					(40)
Reduce the annua									se target o		.79		(43)
not more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i				,			,	ООР					
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
								-	Total = Su	m(44) _{1 12} =	₌	1077.45	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	1077.45	(44)
,								kWh/mor	th (see Ta	ables 1b, 1	c, 1d)	1077.45	(44)
	f hot water 128.1	used - calo	culated mo	onthly = 4.	190 x Vd,r 95.42	m x nm x D 88.42	0Tm / 3600 101.47	102.68	th (see Ta	130.62	c, 1d)		」 ` ′
(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	ables 1b, 1	c, 1d)	1077.45 1412.71	(44)
(45)m= 146.47	128.1 vater heatin	132.19	115.25 of use (no	110.58 hot water	95.42 storage),	88.42 enter 0 in	101.47 boxes (46,	102.68 106 (61)	119.66 Total = Su	130.62 m(45) ₁₁₂ =	c, 1d)		(45)
(45)m= 146.47 If instantaneous w (46)m= 21.97	128.1 vater heatir 19.22	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	130.62	c, 1d)		(45)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage	128.1 vater heatin 19.22 loss:	132.19 ng at point 19.83	115.25 of use (no 17.29	110.58 hot water 16.59	95.42 storage),	88.42 enter 0 in	101.47 boxes (46) 15.22	102.68 100.68 100 to (61)	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d)		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum	128.1 vater heatin 19.22 loss: ne (litres)	132.19 ng at point 19.83 includin	115.25 of use (no 17.29 g any so	110.58 hot water 16.59 Dlar or W	95.42 storage), 14.31 /WHRS	88.42 enter 0 in 13.26 storage	101.47 boxes (46) 15.22 within sa	102.68 100.68 100 to (61)	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h	128.1 vater heatin 19.22 loss: ne (litres) neating a	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 g any so nk in dw	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 g any so nk in dw	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no	128.1 vater heatin 19.22 ne (litres) neating a o stored	132.19 ng at point 19.83 includin nd no ta hot wate	of use (no 17.29 g any so nk in dw er (this in	110.58 hot water 16.59 Dlar or Welling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28		(45) (46) (47)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored loss: turer's de	132.19 ng at point 19.83 includin nd no ta hot wate	of use (no 17.29 g any so nk in dw er (this in	110.58 hot water 16.59 Dlar or Welling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28		(45) (46) (47)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f	19.22 19.22 10ss: ne (litres) neating a constored construction for factor from	132.19 ng at point 19.83 includin nd no ta hot wate eclared lo	of use (not) 17.29 g any so nk in dw er (this in) coss factor 2b	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored loss: turer's defactor fro	132.19 Ing at point 19.83 includin Ind no ta hot wate eclared le m Table storage	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye	110.58 hot water 16.59 plar or W relling, e	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact	128.1 19.22	132.19 Ing at point 19.83 includin ind no ta hot wate eclared lo m Table storage eclared of	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day):	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49) (50)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water storage If community h	19.22 loss: ne (litres) neating a stored loss: turer's defactor from water turer's defage loss neating s	132.19 Ing at point 19.83 including and no tale to the water eclared left storage eclared of factor free sections.	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I om Tabl	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day):	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0 10		(45) (46) (47) (48) (49) (50)
445)m= 146.47 If instantaneous v 46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stor If community h Volume factor	128.1 19.22 10ss: ne (litres) neating a costored closs: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including and no tale and no tale and reclared to factor free sections and the second	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day):	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0 10		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stor If community h Volume factor	128.1 19.22 10ss: ne (litres) neating a costored closs: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including and no tale and no tale and reclared to factor free sections and the second	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day):	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59 47)	c, 1d) 141.85 = 21.28 0 0 10 02		(45) (46) (47) (48) (49) (50) (51)
If instantaneous was (46)m= 21.97 Water storage Storage volum If community h Otherwise if not Water storage a) If manufact Temperature f Energy lost from	128.1 19.22 10.55: ne (litres) neating a constored a loss: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including the i	of use (not) 17.29 g any so nk in dw er (this in) css facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 olar or Water celling, eacludes in the celling of the	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day): known:	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 102.68 10 to (61) 15.4 ame vessers) enter	119.66 Total = Su 17.95 sel er '0' in (130.62 m(45) ₁₁₂ = 19.59 19.59 10	c, 1d) 141.85 = 21.28 0 0 10 02 03		(45) (46) (47) (48) (49) (50) (51) (52)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•		•	•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			i	1	l	
· /	0=.0.	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calcular (see 140.43) m in calcular (see 140.43) s (calcular 40.89) m ins (calcular 140.89)	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if construction only if c	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 tion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See 140.43) Feb 140.43 S (Calculations (culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68) (69)
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include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial from the second seco	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70) (71)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. etc. (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Ins. (Table Ins. (Table Ins. (Table Ins. (Table Ins. Ins. (Table Ins. Ins. Ins. Ins. Ins. Ins. Ins. Ins.	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ole 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	х	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25		0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

									. ,			_					_
Southwe	<u> </u>	0.77	X	0.6	65	X	10	04.39			0.24	X	0.7		=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7		=	59.56	(79)
Southwe	est _{0.9x}	0.77	Х	0.6	55	X	9	2.85			0.24	X	0.7		=	7.03	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	6	9.27			0.24	X	0.7		=	44.43	(79)
Southwe	est _{0.9x}	0.77	X	0.6	65	x	6	9.27] [0.24	X	0.7		=	5.24	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	X	0.7		=	28.27	(79)
Southwe	est _{0.9x}	0.77	X	0.6	65	x	4	4.07			0.24	X	0.7		=	3.34	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	3	1.49			0.24	X	0.7		=	20.2	(79)
Southwe	est _{0.9x}	0.77	x	0.6	55	x	3	1.49			0.24	X	0.7		=	2.38	(79)
																	_
Solar ga	ains in wa	tts, ca	lculated	l for eac	h month				(83)m	= Su	ım(74)m .	(82)m				_	
(83)m=	45.33 8	3.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.0)5		(83)
Total ga	ains – inte	rnal a	nd solar	· (84)m =	= (73)m	+ (8	33)m	, watts					_				
(84)m=	622.79 65	56.94	684.4	712.62	729.21	7'	10.09	679.62	649.	.56	621.77	598.64	592.15	601.	12		(84)
7. Mea	an internal	temp	erature	(heating	season)											
	erature du			, ,		<i>′</i>	area f	from Tab	ole 9,	Th1	I (°C)					21	(85)
•	tion factor	_	•			_					` ,						」
Γ		Feb	Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	De	эс		
(86)m=	0.99	0.99	0.97	0.94	0.85	(0.67	0.5	0.5	Ť	0.78	0.94	0.98	0.9	9		(86)
Mean i	internal te	mner:	ature in	living ar	22 T1 (fo	مااد	w ste	ns 3 to 7	in T	ahle	, 9c)					ı	
(87)m=	1	0.15	20.35	20.61	20.84	_	0.97	20.99	20.9	_	20.92	20.66	20.31	20.0)3		(87)
L		I				<u> </u>			<u> </u>							l	` ,
· -	erature du 20	ring n	eating p	20.02	20.02	_	eiiing :0.03	20.03	20.0	_	20.03	20.02	20.01	20.0	14	1	(88)
(88)m=						<u> </u>			L	03	20.03	20.02	20.01	20.0	,,		(00)
г	tion factor	~~				- 			<u> </u>							1	
(89)m=	0.99).98	0.97	0.92	0.8		0.59	0.4	0.4	4	0.71	0.92	0.98	0.9	9		(89)
Mean_i	internal te	mpera	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)					
(90)m=	18.76 1	8.91	19.19	19.57	19.87	2	0.01	20.03	20.0	03	19.97	19.64	19.15	18.7	73		(90)
											f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean i	internal te	mpera	ature (fo	r the wh	ole dwe	llin	g) = fl	_A × T1	+ (1 -	– fL	A) × T2						
(92)m=	19.09 1	9.24	19.49	19.85	20.12	2	0.26	20.28	20.2	28	20.22	19.91	19.46	19.0)7		(92)
Apply	adjustmer	nt to th	ne mean	interna	temper	atu	re fro	m Table	4e, \	whe	re appro	priate				_	
(93)m=	19.09 1	9.24	19.49	19.85	20.12	2	0.26	20.28	20.2	28	20.22	19.91	19.46	19.0)7		(93)
8. Spa	ce heating	g requ	iirement														
	to the me			•		ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	:(76)m an	d re-	calc	culate	
the util	lisation fac					1							1			1	
		Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	De	ec		
(94)m=	tion factor	or ga 0.98	0.96	0.91	0.81	Γ,	0.61	0.42	0.4	7	0.72	0.92	0.97	0.9	<u> </u>	1	(94)
· · ·	gains, hm					Г,	J.0 I	0.42	0.4	'	0.72	0.92	0.97	0.3			(0 1)
		12.13	657.44	651.26	587.23	4:	31.69	288.54	302.	43	449.1	548.84	575.78	593.	05		(95)
	ly average					_		L				5.5	1 3.0.70	1 230.		I	V = 7
(96)m=		4.9	6.5	8.9	11.7	_	14.6	16.6	16.	4	14.1	10.6	7.1	4.2	2		(96)
_	oss rate fo	r mea				_						1		<u> </u>		I	
_	1205.77 11		1053.8	876.6	672.69		46.3	290.31	305.		484.96	743.42	992.13	1199	.96		(97)
· L		!								!			-			1	

Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m= 441.04	351.72	294.89	162.24	63.58	0	0	0	0	144.77	299.77	451.54		
							Tota	l per year	(kWh/year) = Sum(9	08)15,912 =	2209.56	(98)
Space heatin	g require	ement in	kWh/m²	/year								29.83	(99)
8c. Space co	oling rec	quiremen	nt								_		
Calculated fo	r June, c	July and	August.	See Tal	ble 10b			•		•			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate						1	ì				-		(100)
(100)m= 0 Utilisation fac	0	0	0	0	741.37	583.63	597.87	0	0	0	0		(100)
$\frac{\text{(101)m}=0}{\text{(101)m}}$	0	0	0	0	0.85	0.92	0.89	0	0	0	0		(101)
Useful loss, h						0.02	0.00						` ,
(102)m= 0	0	0	0	0	628.97	534.61	533.86	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)					
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space cooling					dwelling,	continu	ous (kW	h') = 0.0)24 x [(10	03)m – (102)m]x	(41)m	
set (104)m to (104)m= 0	2ero II (104)m <	0	0	88.58	137.36	110.8	0	0	0	0		
(101)					00.00	107.00	110.0	<u> </u>	I = Sum(<u> </u>	= +	336.73	(104)
Cooled fraction	า								cooled	,	4) =	0.6	(105)
Intermittency f	actor (Ta	able 10b)										
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
Space cooling	roquiror	mont for	month -	(104)m	v (10E)	·· (106)	~	Tota	I = Sum((104)	= [0	(106)
(107)m= 0	0	0	0	0	13.31	20.63	16.64	0	0	0	0		
,		l			<u> </u>	<u> </u>	l	L Tota	I I = Sum(<u>1.07)</u>	=	50.58	(107)
Space cooling	requirer	ment in k	(Wh/m²/\	/ear) ÷ (4) =	,		0.68	(108)
9b. Energy red	<u> </u>				scheme)			, , ,		L		
This part is use	•		ĺ	Ŭ			ting prov	ided by	a comm	unity scl	neme		_
Fraction of spa	ace heat	from se	condary,	supplen/	nentary I	heating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so includes boilers, h									up to four	other heat	sources; th	e latter	_
Fraction of hea	at from C	Commun	ity CHP									0.13	(303a)
Fraction of cor	nmunity	heat fro	m heat s	ource 2							Ī	0.87	(303b)
Fraction of total	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	ia) =	0.13	(304a)
Fraction of total	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	(sb) =	0.87	(304b)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem		ŗ	1	(305)
Distribution los	s factor	(Table 1	2c) for (commun	ity heatiı	ng syste	m				ŗ	1.05	(306)
Space heating	9										L	kWh/yea	r_
Annual space	heating	requirem	nent									2209.56	
Space heat fro	m Com	munity C	HP					(98) x (3	04a) x (30	5) x (306)	=	301.6	(307a)

					_
Space heat from heat source 2		(98) x (304b) x (30	05) x (306) =	2018.43	(307b)
Efficiency of secondary/supplementary heating sy	stem in % (from Tab	le 4a or Appendi	x E)	0	(308
Space heating requirement from secondary/supple	ementary system	(98) x (301) x 100	÷ (308) =	0	(309)
Water heating Annual water heating requirement			ı	2063.55	7
If DHW from community scheme:		(0.4) (202-) (20	05) ·· (206)		_
Water heat from Community CHP		(64) x (303a) x (30	, , ,	281.67	(310a)
Water heat from heat source 2	0.6	(64) x (303b) x (30		1885.05	(310b)
Electricity used for heat distribution	0.0	1 x [(307a)(307e)	+ (310a)(310e)] =	44.87	(313)
Cooling System Energy Efficiency Ratio		(10-)	ļ	4.73	(314)
Space cooling (if there is a fixed cooling system, if	,	= (107) ÷ (314) =		10.71	(315)
Electricity for pumps and fans within dwelling (Tab mechanical ventilation - balanced, extract or posit		Э	[158.57	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) -	+ (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix L)				325.25	(332)
10b. Fuel costs – Community heating scheme					
	Fuel kWh/year	Fuel I (Table	Price e 12)	Fuel Cost £/year	
Space heating from CHP		(Table			(340a)
Space heating from CHP Space heating from heat source 2	kWh/year	(Table	∋ 12) 	£/year	(340a) (340b)
•	kWh/year (307a) x	(Table 2. 4.	e 12) 97	£/year 8.96	_
Space heating from heat source 2	kWh/year (307a) x (307b) x	(Table 2. 4. 2.	97 × 0.01 = 24 × 0.01 =	£/year 8.96 85.58	(340b)
Space heating from heat source 2 Water heating from CHP	kWh/year (307a) x (307b) x (310a) x	(Table 2. 4. 2.	e 12) 97	£/year 8.96 85.58 8.37	(340b) (342a)
Space heating from heat source 2 Water heating from CHP	kWh/year (307a) x (307b) x (310a) x	(Table 2. 4. Fuel i	e 12) 97	£/year 8.96 85.58 8.37	(340b) (342a)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 2. 4. Fuel i	97	£/year 8.96 85.58 8.37 79.93	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93	(340b) (342a) (342b) (348)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9	(340b) (342a) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120	(340b) (342a) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)(kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120	(340b) (342a) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)(11b. SAP rating - Community heating scheme Energy cost deflator (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120 368.06	(340b) (342a) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)(11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x (35)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 342e) + (345)(354) =	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120 368.06	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)(11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x (35) SAP rating (section12) 12b. CO2 Emissions – Community heating scheme	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 342e) + (345)(354) =	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120 368.06 0.42 1.3 81.89	(340b) (342a) (342b) (348) (349) (350) (351) (355) (356) (357) (358)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost = (340a)(11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x (35)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332) 342e) + (345)(354) =	(Table 2. 4.	e 12) 97	£/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120 368.06 0.42 1.3	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357)

		Energy kWh/year	Emission facto	or Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	478.74 ×	0.22	103.41	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	146.49 ×	0.52	-76.03	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) to	(366) for the second	fuel 96.7	(367b)
CO2 associated with heat source 2	[(307)	b)+(310b)] x 100 ÷ (367b) x	0.22	= 871.93	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 23.29	(372)
Total CO2 associated with commu	nity systems	(363)(366) + (368)(37	72)	948.16	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	nmersion heater or instanta	aneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		948.16	(376)
CO2 associated with space cooling	9	(315) x	0.52	= 5.56	(377)
CO2 associated with electricity for	pumps and fans within dwo	elling (331)) x	0.52	= 82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 168.8	(379)
Total CO2, kg/year	sum of (376)(382) =			1204.81	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			16.27	(384)
El rating (section 14)				00.44	
				86.44	(385)
13b. Primary Energy – Community	heating scheme				
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme			30.6	(361)
13b. Primary Energy – Community	heating scheme	Energy	Primary	30.6	
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor	30.6	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =		-	30.6 63 P.Energy	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor	30.6 63 P.Energy kWh/year	(361)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year	factor	30.6 63 P.Energy kWh/year	(361) (362) (363)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$	kWh/year 478.74	1.22 3.07	30.6 63 P.Energy kWh/year 584.06	(361) (362) (363) (364)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 478.74	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02	(361) (362) (363) (364) (365)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	478.74 × 146.49 × 447.1 × 136.81 ×	1.22 3.07 1.22 3.07	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02	(361) (362) (363) (364) (365) (366)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 478.74	1.22 3.07 1.22 3.07 0 (366) for the second	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02 fuel 96.7	(361) (362) (363) (364) (365) (366) (367b)
13b. Primary Energy – Community Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 478.74	1.22 3.07 1.22 3.07 0 (366) for the second 1.22	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02 fuel 96.7 = 4924.77	(361) (362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems	kWh/year 478.74	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 1.22	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02 fuel 96.7 = 4924.77 = 137.74	(361) (362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comments	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise)	kWh/year 478.74	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 1.22	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02 fuel 96.7 = 4924.77 = 137.74 = 5322.28	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) munity systems (unless specified otherwise ting (secondary)	kWh/year 478.74	1.22 3.07 1.22 3.07 0 (366) for the second 1.22 1.22 22)	30.6 63 P.Energy kWh/year 584.06 -449.74 545.46 -420.02 fuel 96.7 = 4924.77 = 137.74 = 5322.28 5322.28	(361) (362) (363) (364) (365) (366) (367b) (368) (372) (373) (373)

Total Primary Energy, kWh/year	sum of (376)(382) =				6840.47	(383)
Energy associated with electricity for lighting	(332))) x		3.07	=	998.51	(379)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	486.81	(378)
Energy associated with space cooling	(315) x		3.07	=	32.87	(377)

		User D	etails:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
		Property A	Address	Flat 3-2	2-Clean				
Address :									
1. Overall dwelling dime	ensions:								
Dagament		Area	` '	(4 -)		ight(m)	7(0-)	Volume(m³	_
Basement				(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 76	6.06	(4)					
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:			_		_				
	main seconda heating heating	ry (other		total			m³ per hou	r
Number of chimneys	0 + 0	+	0] = [0	X ·	40 =	0	(6a)
Number of open flues	0 + 0	= + =	0	Ī = Ē	0	x :	20 =	0	(6b)
Number of intermittent fa	ans			, <u> </u>	0	x	10 =	0	(7a)
Number of passive vents	S			F	0	x	10 =	0	(7b)
Number of flueless gas f	ires			F	0	x -	40 =	0	(7c)
				L					(10)
							Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$	(7a)+(7b)+(7	7 c) =	Γ	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce	ed to (17), o	therwise o	continue fr	om (9) to	(16)			-
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration	OF for stool or timber from a	r 0 25 for	maaan	, constr	untion	[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber frame of the contract			•	uction			0	(11)
deducting areas of openi	ings); if equal user 0.35	-		·					_
•	floor, enter 0.2 (unsealed) or (0.1 (seale	d), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	v (14) ± 1	001 -			0	(14)
Infiltration rate			(8) + (10)			+ (15) =		0	(15)
	q50, expressed in cubic metr						area	0	(16)
•	lity value, then $(18) = [(17) \div 20] +$	•	•	•	cuc or c	лисюрс	arca	0.15	(18)
·	es if a pressurisation test has been do				is being u	sed		0.10	()
Number of sides sheltered	ed							3	(19)
Shelter factor			(20) = 1 -	[0.075 x (1	[9)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified f							•	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7						•	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
								ı	

Adjusted infiltr	ation rat	e (allowi	ng for st	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effec		_	rate for t	he appli	cable ca	se							
If mechanica				(.=	. (22)	\		إ	0.5	(23a
If exhaust air h) = (23a)		Į	0.5	(23b
If balanced with		-	-	_							L	76.5	(230
a) If balance	1			i —	1							÷ 100]	.
(24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(24a
b) If balance	1			i			r ``	``	 				,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h if (22b)n	nouse ex n < 0.5 ×								5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n	ventilation			•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er) or (24k	o) or (24	c) or (24	d) in box	(25)	-		-		
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losse	s and he	at loss i	narameti	≏r.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/ł	()	k-value kJ/m²-k		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1.	/[1/(1.2)+	0.04] =	4.52	=			(27)
Windows Type	e 3				5.51	x1.	/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type	e 4				0.65		/[1/(1.2)+	0.04] =	0.74	=			(27)
Walls Type1	38.1	4	20.58	8	17.56	=			2.63	=		¬	(29)
Walls Type2	23.9		2.6		21.32	=	0.15	-	3.2	룩 ¦		╡╠	(29)
Walls Type3				_		_		=		- 		╡╠	(29)
Walls Types Walls Type4	5.9		0	=	5.95	×	0.15	=	0.89	북 ¦		╡╠	=
Roof	29.5		0	_	29.51	=	0.15	=	4.43	_		╡	(29)
NUUI	1 00 4				20.45	5 X	0.15	=	3.07			_	(30)
	20.4		0			=							
Total area of e	L		0		117.9	_						- —	`
Total area of e Party wall	L					_	0	= [0	_ [] [(32)
Total area of e Party wall Party floor	L				117.9	×	0	= [0				(32)
Total area of e Party wall Party floor Party ceiling	elements	, m²			117.9 12.35 76.06 55.61	x] []]			(32)
Total area of e Party wall Party floor Party ceiling * for windows and	elements	, m²	effective wi		117.9 12.35 76.06 55.61	x				[[s given in	paragraph	3.2	(32)
Total area of e Party wall Party floor Party ceiling * for windows and ** include the area	elements I roof winde	, m² ows, use e sides of in	effective wi		117.9 12.35 76.06 55.61	x ated using	ı formula 1	/[(1/U-valu		[[s given in	paragraph		(32) (32) (32)
Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los	elements I roof winde as on both ss, W/K =	ows, use e sides of in	effective wi		117.9 12.35 76.06 55.61	x ated using		/[(1/U-valu) + (32) =	ıe)+0.04] a		[40.9	(32) (32) (32) (32)
Total area of e Party wall Party floor Party ceiling * for windows and	elements I roof winder as on both as, W/K = Cm = S(ows, use e sides of in = S (A x (A x k)	effective wi nternal wall U)	ls and par	117.9 12.35 76.06 55.61 alue calcul	x x	ı formula 1	/[(1/U-valu) + (32) = ((28)		?) + (32a).	[(31) (32) (32) (32) (32) (33) (34) (35)

can be used inste	ead of a de	tailed calci	ulation.										
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix I	K						23.27	(36)
if details of therm	,	,			•								` ′
Total fabric he	eat loss							(33) +	(36) =			64.17	(37)
Ventilation he	at loss ca	alculated	monthly	У				(38)m	= 0.33 × (25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	80.13	(39)
(40)m= 1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
Number of da	ys in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.05	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
	•		•	•	•	•	•		•	•	•	•	
4. Water hea	iting ene	rgy requi	irement:								kWh/y	ear:	
												1	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.38		(42)
Annual average	•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).82	1	(43)
Reduce the annu	_				_	_	to achieve	a water us	se target o	f		J	
not more that 125				aler use, r	ioi and co	•	1		<u> </u>		1	1	
Jan Hot water usage	Feb	Mar	Apr	May	Jun	Jul Toble 10 Y	Aug	Sep	Oct	Nov	Dec		
	· ·		i	· 			· <i>′</i>					1	
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	4000.0	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
				_					Total = Su	m(45) ₁₁₂ =	-	1428.9	(45)
If instantaneous v	vater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	•			•	
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storage Storage volun		includin	na anv sa	olar or M	/WHRS	storana	within sa	ame ves	امء		0	1	(47)
If community I	, ,		•			_		arric ves	301		U]	(47)
Otherwise if n	_			-			. ,	ers) ente	er '0' in (47)			
Water storage			(1)					, ,	(,			
a) If manufac	turer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Temperature	factor fro	m Table	2b								0]	(49)
Energy lost fro		_	-				(48) x (49)) =		1	10		(50)
b) If manufac			-									- 1	<i>,</i> .
Hot water stor If community I	_			e∠(KVV	ri/litre/da	ay)				0.	.02]	(51)
Volume factor	_		UII 7.U							1	.03	1	(52)
Temperature			2b								0.6	1	(53)

Energy lost from water storage	e, kWh/year		((47) x (51)) x (52) x (5	53) =	1.	03		(54)
Enter (50) or (54) in (55)							1.	03		(55)
Water storage loss calculated	for each month		(((56)m = (55) × (41)r	n				
(56)m= 32.01 28.92 32.01	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated solar sto	orage, (57)m = (56)m	x [(50) – (H	111)] ÷ (50), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01 28.92 32.01	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) fro	om Table 3							0		(58)
Primary circuit loss calculated		59)m = (5	58) ÷ 36	5 × (41)	m					
(modified by factor from Tab	le H5 if there is s	solar wate	er heatin	ig and a	cylinde	thermo	stat)			
(59)m= 23.26 21.01 23.26	22.51 23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for each	n month (61)m =	(60) ÷ 36	5 × (41)	m						
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water h	eating calculated	for each	month ((62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42 179.5 188.98	170.06 167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input calculated using App	endix G or Appendix	H (negative	e quantity)) (enter '0	' if no solaı	contributi	on to wate	er heating)		
(add additional lines if FGHRS	and/or WWHRS	applies,	see App	oendix (3)					
(63)m= 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
(64)m= 203.42 179.5 188.98	170.06 167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
				Outp	out from wa	ater heate	(annual)	12	2079.74	(64)
Heat gains from water heating	, kWh/month 0.2	5 ′ [0.85 >	× (45)m	+ (61)m	n1 + 0 8 x	[(46)m	+ (57)m	+ (59)m	1	
		-	('-)	. (0.)	.,	[(10)111	. (5.)	. (00)111	J	
(65)m= 93.48 83.02 88.68	81.55 81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93	J	(65)
(65)m= 93.48 83.02 88.68 include (57)m in calculation	81.55 81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
` '	81.55 81.41 of (65)m only if c	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in calculation 5. Internal gains (see Table 5)	81.55 81.41 of (65)m only if c 5 and 5a):	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in calculation	81.55 81.41 of (65)m only if c 5 and 5a):	74.89	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War	81.55 81.41 of (65)m only if c 5 and 5a):	74.89 ylinder is	73.96 in the d	78.35 Iwelling	77.33 or hot w	84.47 ater is fr	86.72 om com	91.93 munity h		(65)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03	81.55 81.41 of (65)m only if conditions and 5a): tts Apr May 143.03 143.03	74.89 ylinder is Jun 143.03	73.96 in the d	78.35 Iwelling Aug 143.03	77.33 or hot was Sep 143.03	84.47 ater is fr	86.72 om com	91.93 munity h		
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar	81.55 81.41 of (65)m only if conditions and 5a): tts Apr May 143.03 143.03	74.89 ylinder is Jun 143.03	73.96 in the d	78.35 Iwelling Aug 143.03	77.33 or hot was Sep 143.03	84.47 ater is fr	86.72 om com	91.93 munity h		
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A 67)m= 47.03 41.77 33.97	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22	74.89 rylinder is Jun 143.03 rion L9 or 16.23	73.96 in the d Jul 143.03 L9a), als 17.54	Aug 143.03 so see 22.8	77.33 or hot was Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 om com Nov 143.03	91.93 munity h		(66)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1:	73.96 in the d Jul 143.03 L9a), als 17.54	Aug 143.03 so see 22.8	77.33 or hot was Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 om com Nov 143.03	91.93 munity h		(66)
include (57)m in calculation 5. Internal gains (see Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A 67)m= 47.03 41.77 33.97 Appliances gains (calculated in (68)m= 314.94 318.21 309.97	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, eq 292.44 270.31	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51	73.96 in the d Jul 143.03 L9a), al: 17.54 3 or L13 235.61	78.35 welling Aug 143.03 so see 22.8 3a), also 232.34	77.33 or hot was Sep 143.03 Table 5 30.6 see Tal 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11	86.72 om com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in calculation 5. Internal gains (see Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A 67)m= 47.03 41.77 33.97 Appliances gains (calculated in A 67)m= 47.03 41.77 33.97	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, eq 292.44 270.31	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51	73.96 in the d Jul 143.03 L9a), al: 17.54 3 or L13 235.61	78.35 welling Aug 143.03 so see 22.8 3a), also 232.34	77.33 or hot was Sep 143.03 Table 5 30.6 see Tal 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11	86.72 om com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A 67)m= 47.03 41.77 33.97 Appliances gains (calculated in 68)m= 314.94 318.21 309.97 Cooking gains (calculated in A 69)m= 51.69 51.69 51.69	81.55 81.41 of (65)m only if conditions only if conditions only if conditions only if conditions only if conditions on the conditions of the conditions on the conditions on the conditions on the conditions on the conditions on the conditions on the conditions on t	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1 249.51 tion L15 o	73.96 in the d Jul 143.03 L9a), als 17.54 3 or L13 235.61 or L15a),	78.35 Iwelling Aug 143.03 so see 22.8 Ba), also 232.34 , also se	77.33 or hot was Sep 143.03 Table 5 30.6 o see Table 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5	86.72 om com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A) (67)m= 47.03 41.77 33.97 Appliances gains (calculated in (68)m= 314.94 318.21 309.97 Cooking gains (calculated in A)	81.55 81.41 of (65)m only if conditions only if conditions only if conditions only if conditions only if conditions on the conditions of the conditions on the conditions on the conditions on the conditions on the conditions on the conditions on the conditions on t	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1 249.51 tion L15 o	73.96 in the d Jul 143.03 L9a), als 17.54 3 or L13 235.61 or L15a),	78.35 Iwelling Aug 143.03 so see 22.8 Ba), also 232.34 , also se	77.33 or hot was Sep 143.03 Table 5 30.6 o see Table 240.58	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5	86.72 om com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A) (67)m= 47.03 41.77 33.97 Appliances gains (calculated in A) (68)m= 314.94 318.21 309.97 Cooking gains (calculated in A) (69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 5) (70)m= 0 0 0	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, equat 292.44 270.31 ppendix L, equat 51.69 51.69 5a) 0 0	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 or 51.69	73.96 in the d Jul 143.03 L9a), ala 17.54 3 or L13 235.61 or L15a), 51.69	78.35 Iwelling Aug 143.03 so see 22.8 3a), also 232.34 , also se 51.69	77.33 or hot was Sep 143.03 Table 5 30.6 o see Tale 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 om com Nov 143.03 45.34 280.24	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A (67)m= 47.03 41.77 33.97 Appliances gains (calculated in (68)m= 314.94 318.21 309.97 Cooking gains (calculated in A (69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 5) (70)m= 0 0 0 Losses e.g. evaporation (negative factors)	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, eq 292.44 270.31 ppendix L, equat 51.69 51.69 5a) 0 0 tive values) (Tab	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 o 51.69 0 ole 5)	73.96 in the d Jul 143.03 L9a), ala 17.54 3 or L13 235.61 or L15a), 51.69	78.35 Iwelling Aug 143.03 so see 22.8 Ba), also 232.34 , also se 51.69	77.33 or hot was Sep 143.03 Table 5 30.6 see Table 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 om com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04 51.69		(66) (67) (68) (69)
include (57)m in calculation 5. Internal gains (see Table 5), War Jan	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, eq 292.44 270.31 ppendix L, equat 51.69 51.69 5a) 0 0 tive values) (Tab	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 or 51.69	73.96 in the d Jul 143.03 L9a), ala 17.54 3 or L13 235.61 or L15a), 51.69	78.35 Iwelling Aug 143.03 so see 22.8 3a), also 232.34 , also se 51.69	77.33 or hot was Sep 143.03 Table 5 30.6 o see Tale 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 om com Nov 143.03 45.34 280.24	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A 67)m= 47.03 41.77 33.97 Appliances gains (calculated in 68)m= 314.94 318.21 309.97 Cooking gains (calculated in A 69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 5) Pumps e.gs. as evaporation (negative) (70)m= 0 0 0 Losses e.g. evaporation (negative) (71)m= -95.35 -95.35 Water heating gains (Table 5)	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, equat 292.44 270.31 ppendix L, equat 51.69 51.69 5a) 0 0 tive values) (Tab	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 or 51.69 0 ole 5) -95.35	73.96 in the d Jul 143.03 L9a), ala 17.54 3 or L13 235.61 or L15a), 51.69	78.35 Iwelling Aug 143.03 so see 22.8 Ba), also 232.34 , also se 51.69	77.33 or hot was Sep 143.03 Table 5 30.6 see Table 240.58 ee Table 51.69	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0	86.72 om com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04 51.69 0		(66) (67) (68) (69)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A (67)m= 47.03 41.77 33.97 Appliances gains (calculated in 68)m= 314.94 318.21 309.97 Cooking gains (calculated in A (69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 5) (70)m= 0 0 0 Losses e.g. evaporation (negative for the following gains) Water heating gains (Table 5) (72)m= 125.65 123.55 119.19	81.55 81.41 of (65)m only if cond 5a): tts Apr May 143.03 143.03 ppendix L, equat 25.72 19.22 n Appendix L, equat 292.44 270.31 ppendix L, equat 51.69 51.69 5a) 0 0 tive values) (Tab	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 o 51.69 0 ole 5) -95.35	73.96 in the d Jul 143.03 L9a), al: 17.54 3 or L13 235.61 or L15a), 51.69 0 -95.35	78.35 welling	77.33 or hot was Sep 143.03 Table 5 30.6 see Table 240.58 ee Table 51.69 0	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70)
include (57)m in calculation 5. Internal gains (see Table 6) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A) (67)m= 47.03 41.77 33.97 Appliances gains (calculated in A) (68)m= 314.94 318.21 309.97 Cooking gains (calculated in A) (69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 6) (70)m= 0 0 0 Losses e.g. evaporation (negation of the cooking gains (Table 6) (71)m= -95.35 -95.35 -95.35 Water heating gains (Table 5) (72)m= 125.65 123.55 119.19 Total internal gains =	81.55 81.41 of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 or 51.69 0 ole 5) -95.35 104.01 (66)n	73.96 in the d Jul 143.03 L9a), als 17.54 3 or L13 235.61 or L15a), 51.69 0 -95.35	78.35 welling	77.33 or hot was Sep 143.03 Table 5 30.6 see Table 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), War Jan Feb Mar (66)m= 143.03 143.03 143.03 Lighting gains (calculated in A (67)m= 47.03 41.77 33.97 Appliances gains (calculated in 68)m= 314.94 318.21 309.97 Cooking gains (calculated in A (69)m= 51.69 51.69 51.69 Pumps and fans gains (Table 5) (70)m= 0 0 0 Losses e.g. evaporation (negative for the following gains) Water heating gains (Table 5) (72)m= 125.65 123.55 119.19	81.55 81.41 of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if of (65)m only if	74.89 ylinder is Jun 143.03 ion L9 or 16.23 uation L1: 249.51 tion L15 or 51.69 0 ole 5) -95.35 104.01 (66)n	73.96 in the d Jul 143.03 L9a), al: 17.54 3 or L13 235.61 or L15a), 51.69 0 -95.35	78.35 Iwelling Aug 143.03 so see 22.8 Ba), also 232.34 , also se 51.69 0 -95.35 105.3 + (68)m +	77.33 or hot was Sep 143.03 Table 5 30.6 0 see Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35 113.53 70)m + (7	86.72 om com Nov 143.03 45.34 280.24 51.69 0 -95.35 120.45 1)m + (72)	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	x	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

Southwe	est _{0.9x}	0.77	x	0.6	35	X	10	04.39			0.24	x	0.7	=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	X	9	2.85]		0.24	x [0.7		59.56	(79)
Southwe	est _{0.9x}	0.77	x	0.6	S5	x	9	2.85			0.24	x	0.7		7.03	(79)
Southwe	est _{0.9x}	0.77	x	5.5	51	x	6	9.27			0.24	x [0.7		44.43	(79)
Southwe	est _{0.9x}	0.77	х	0.6	65	x	6	9.27			0.24	x [0.7	=	5.24	(79)
Southwe	est _{0.9x}	0.77	Х	5.5	51	X	4	4.07			0.24	x [0.7		28.27	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	4	4.07			0.24	х	0.7		3.34	(79)
Southwe	est _{0.9x}	0.77	х	5.5	51	x	3	1.49			0.24	_ x [0.7		20.2	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	3	31.49			0.24	×	0.7	<u> </u>	2.38	(79)
	_					•										
Solar ga	ains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total ga	ains – ir	nternal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts							_	
(84)m=	632.31	666.4	693.47	721.08	737.03	71	17.34	686.56	656	6.6	629.18	606.65	600.84	610.35	5	(84)
7. Mea	an inter	nal tem	perature	(heating	season)										
			neating p	`		<i>'</i>	area f	from Tab	ole 9.	, Th	1 (°C)				21	(85)
•		J	ains for I			•			,	,	()					`
Γ	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	:	
(86)m=	0.99	0.99	0.97	0.94	0.85	().67	0.5	0.5	Ť	0.78	0.94	0.98	0.99	7	(86)
Mooni	intorna	Ltompor	ature in	living or	oo T1 /f/	مالد	w cto	nc 2 to 7	I 7 in T	I	. 00)		1	1		
(87)m=	20.08	20.18	20.37	20.63	20.85	_	0.97	20.99	20.9		20.93	20.67	20.34	20.06	٦	(87)
L									<u> </u>	I			1 20.0			(- /
· -			neating p		·	_		1		$\overline{}$	<u> </u>	00.04	1 00 04		¬	(00)
(88)m=	20.02	20.03	20.03	20.04	20.04		0.05	20.05	20.0	05	20.05	20.04	20.04	20.03		(88)
Utilisat	tion fac	tor for g	ains for i	rest of d	welling,	h2,	m (se	e Table	9a)						_	
(89)m=	0.99	0.98	0.97	0.92	0.8	C	0.59	0.4	0.4	14	0.7	0.92	0.98	0.99		(89)
Mean i	interna	l temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m=	18.82	18.97	19.24	19.61	19.9	2	0.03	20.05	20.0	05	19.99	19.68	19.2	18.79		(90)
_											f	LA = Liv	ng area ÷ (4) =	0.26	(91)
Mean i	interna	l temper	ature (fo	r the wh	ole dwe	llind	a) = fl	LA x T1	+ (1	– fL	A) x T2					
(92)m=	19.14	19.28	19.53	19.87	20.14		0.27	20.29	20.2		20.23	19.93	19.49	19.12	7	(92)
Apply :	adjustn	nent to t	he mean	interna	l temper	<u> </u>	re fro	m Table	4e,	whe	re appro	priate	ļ		_	
(93)m=	19.14	19.28	19.53	19.87	20.14	2	0.27	20.29	20.2	29	20.23	19.93	19.49	19.12	7	(93)
8. Spa	ice hea	ting requ	uirement						<u> </u>							
Set Ti	to the r	mean int	ternal ter	nperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the util	lisation	factor fo	or gains	using Ta	ble 9a	_		i	ı						_	
L	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	:	
			ains, hm										1	l	¬	(0.4)
(94)m=	0.98	0.98	0.96	0.91	0.8	(0.61	0.42	0.4	16	0.72	0.92	0.97	0.99		(94)
			W = (94)	<u> </u>		1 4	040	000.40	004	40	450.44	550.00	T 504.40	000.0	. 7	(OF)
` ' L	622.58	651.67	666.51	659.26	592.98	<u> </u>	34.6	290.12	304	.19	453.11	556.23	584.49	602.37		(95)
	ly avera	age exte	rnal tem		11.7	_		16.6	16	<u>, I</u>	1/1	10.6	7 1	4.2	7	(96)
(96)m=			6.5	8.9	<u> </u>	Ь_	14.6	16.6	16.		14.1	10.6	7.1	4.2	_	(30)
			an intern	·	675.13	_	, VV = 48.18	=[(39)m] 291.7	x [(9.	_ _	- (96)m 486.99	746.49	996.1	1204.4	8	(97)
(07)111-	.200.07	1100.00	1007.27	0,0.00	070.10		.0.10	201.7	L 300	., 0	-50.33	70.49	330.1	1 1204.4	<u> </u>	(3.)

Space heating requirement in kWh/m²/year Scale S	Space heating	ng require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
Space heating requirement in kWh/m²/year Space S	(98)m= 436.8	347.88	290.73	158.85	61.12	0	0	0	0	141.56	296.36	447.97		
Second S								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2181.26	(98)
Calculated for June, July and August, See Table 10b	Space heating	ng require	ement in	kWh/m²	² /year								28.68	(99)
Space cooling requirement for month, whole develling, continuous (kWh) = 0.024 x [(103)m - (102)m 0 0 0 0 0 0 0 0 0	8c. Space co	oling rec	quiremen	nt										
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10	Calculated for	r June, c	July and	August.	See Tal	ble 10b		1	·	1	·			
Description Description				<u> </u>					<u> </u>					
Utilisation factor for loss hm						· ·	1	ì				$\overline{}$		(100)
Useful loss, hmLm (Watts) = (100)m × (101)m 0 0 0 0 0 0 0 0 0	` '	1			0	743.01	304.92	399.29	0		0	0		(100)
Gains (solar gains calculated for applicable weather region, see Table 10) Gains (solar gains calculated for applicable weather region, see Table 10) (103)m=		1		0	0	0.85	0.92	0.9	0	0	0	0		(101)
Gains (solar gains calculated for applicable weather region, see Table 10) (103)m 0 0 0 0 0 0 759.25 726.17 889.83 0 0 0 0 0 0 (Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m (104)m 10 zero if (104)m < 3 x (98)m (104)m 0 0 0 0 0 89.76 139.66 112.76 0 0 0 0 (105)m 0 0 0 0 0 89.76 139.66 112.76 0 0 0 0 (106)m 0 0 0 0 0 0 0 0 0.25 0.25 0.25 0.25 0 0 0 0 (106)m 0 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0 0 (106)m 0 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 (106)m 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 0 (107)m 0 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 0 (108)b Energy requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) (108)b Energy requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from community system 1 - (301) = 1 (302) (303) = 0.13 (303) (303) = 0.13 (303) (303) = 0.13 (303) (303) = 0.13 (303) (303) (303) = 0.13 (303) (3	` ′	nmLm (V	vatts) = ((100)m x	(101)m	<u>!</u>	ļ	ļ		ļ				
103 m		- `		` 	` 	1	538.46	538.26	0	0	0	0		(102)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m 04)m	Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	•				
Set (104)m to zero if (104)m < 3 × (98)m	(/			<u> </u>	<u> </u>	l	l	l						(103)
104 m	•	•				dwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	(41)m	
Total = Sum(1,04) = 342.18 (104) f C = cooled area ÷ (4) = 0.59 (105) ntermittency factor (Table 10b) 106)m = 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0 0 Space cooling requirement for month = (104)m × (105) × (106)m 107)m = 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 Total = Sum(1,04) = 0 (106) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter necludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304) Fraction of total space heat from Community Heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heating system 1 (305) Space heating Annual space heating requirement	` —				Í	89.76	139.66	112.76	0	0	0	0		
Intermittency factor (Table 10b) Intermittency factor (Table 10b)	` ′					ļ	ļ	ļ	Tota	l = Sum(1 <u>0</u> 4)	=	342.18	(104)
Total = Sum(104) = 0 0 0 0 0 0 0 0 0	Cooled fractio	n							f C =	cooled	area ÷ (4	4) =	0.59	(105)
Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(104) = 0 (106) Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(107) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter raction of heat from Community CHP (302) × (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heating system (305a) Fraction of space heating method (Table 4c(3)) for community heating system (305a) Fraction of community requirement (305a)		- `		i –		1	1	1	<u> </u>	1				
Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(1,07) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter raction of heat from Community CHP (302) × (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heating system 1.05 (306a) Fraction of space heating method (Table 4c(3)) for community heating system 1.05 (306a) Fraction of space heating requirement 2 (306a)	(106)m= 0	0	0	0	0	0.25	0.25	0.25	l	l	l	<u> </u>		7(400)
Total = Sum(107) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 50.05 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter ractudes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) × (303a) = 0.13 (303) Fraction of total space heat from Community heat source 2 (302) × (303a) = 0.13 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304)	Space cooling	ı requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	rota	i = Surri(1 <u>U4</u>)	= [0	(106)
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 — (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter recludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) × (303a) = 0.13 (304) Fraction of total space heat from Community CHP (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of control and charging method (Table 4c(3)) for community heating system 1 (305) Fraction of control and charging method (Table 4c(3)) for community heating system 1.05 (306) Fraction of control and charging method (Table 4c(3)) for community heating system 1.05 (306)	· —	 			` 	- ` 	``		0	0	0	0		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 1 (302) Fraction of total space heat from Community CHP 2 (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heating system 1 (305) Fraction of total space heat from community heating system 1.05 (306b)		•							Tota	l = Sum(107)	=	50.05	(107)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 1 (302) Fraction of total space heat from Community CHP 2 (302) x (303a) = 3 (304x 3 (304x 3 (305x) = 4 (305x) 5 (306x) 6 (306x)	Space cooling	requirer	ment in k	kWh/m²/y	/ear				(107) ÷ (4) =		Ī	0.66	(108)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none [7] The community system 1 – (301) = [7] The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP [7] Fraction of community heat from heat source 2 [8] Fraction of total space heat from Community CHP [8] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heating method (Table 4c(3)) for community heating system [9] Graction of total space heating requirement [9] Graction of total space heating requirement [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space	9b. Energy re	quiremer	nts – Cor	mmunity	heating	scheme)							
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1											unity sch	neme.		_
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community	Fraction of sp	ace heat	from se	condary,	/supplen	nentary l	heating	(Table 1	1) '0' if n	one			0	(301)
recludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 1.05 Space heating KWh/year 2181.26	Fraction of sp	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from Community heat source 2 (302) × (303b) = 0.87 (304b) (305) Oistribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement	-									up to four	other heat	sources; th	e latter	
Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) (305) Fraction of total space heat from Community heat source 2 (302) × (303b) = 1 (305) (306) Space heating Annual space heating requirement			-		aste neat t	rom powe	r stations.	See Appei	naix C.			Г	0.13	(303a
Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) Fractor for control and charging method (Table 4c(3)) for community heating system 1 (305) Space heating Annual space heating requirement (302) × (303a) = 0.13 (304a) (304a) (302) × (303b) = 0.87 (304b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (306) × (307) × (307) × (305b) = 0.87 (305b) (307) × (30				•	ourco 2							L T		Ⅎ`
Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304f) Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Cistribution loss factor (Table 12c) for community heating system 5 pace heating Annual space heating requirement 2 181.26		•								-				=
Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Cistribution loss factor (Table 12c) for community heating system 1.05 (306) KWh/year Annual space heating requirement 2181.26	Fraction of tot	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a
Distribution loss factor (Table 12c) for community heating system 1.05 KWh/year	Fraction of tot	al space	heat fro	m comm	nunity he	eat sourc	e 2			(3	02) x (303	b) =	0.87	(304b
Space heating Annual space heating requirement kWh/year 2181.26	Factor for con	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem			1	(305)
Annual space heating requirement 2181.26	Distribution lo	ss factor	(Table 1	2c) for o	commun	ity heati	ng syste	m				Ī	1.05	(306)
Annual space heating requirement 2181.26	Space heatin	g										L	kWh/yea	 r
Space heat from Community CHP (98) x (304a) x (305) x (306) = 297.74 (307a)	-	_	requiren	nent									-	
· · · · · · · · · · · · · · · · · · ·	Space heat fro	om Comr	munity C	HP					(98) x (3	04a) x (30	5) x (306) :	-	297.74	(307a)

				_
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1992.58	(307b)
Efficiency of secondary/supplementary he	eating system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from seconda	ry/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating				_
Annual water heating requirement			2079.74	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	283.88	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	1899.84	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)]	= 44.74	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling s	system, if not enter 0)	= (107) ÷ (314) =	10.59	(315)
Electricity for pumps and fans within dwel mechanical ventilation - balanced, extract		e	162.85	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Appendic	x L)		332.22	(332)
10b. Fuel costs – Community heating so	heme			
	Ford		- 10 (
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP			£/year	(340a)
Space heating from CHP Space heating from heat source 2	kWh/year	(Table 12)	£/year = 8.84	(340a) (340b)
,	kWh/year (307a) x	(Table 12) 2.97 x 0.01	£/year = 8.84 = 84.49	
Space heating from heat source 2	kWh/year (307a) x (307b) x	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43	(340b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55	(340b) (342a) (342b)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system	kWh/year (307a) x (307b) x (310a) x (310b) x (315)	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55	(340b) (342a) (342b) (348)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting	kWh/year (307a) x (307b) x (310a) x (310b) x (315)	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48	(340b) (342a) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48	(340b) (342a) (342b) (342b) (348) (349)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331)	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82	(340b) (342a) (342b) (348) (349) (350)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12)	kWh/year (307a) x (307b) x (310a) x (310b) x () (315) (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost	kWh/year (307a) x (307b) x (310a) x (310b) x () (315) (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82	(340b) (342a) (342b) (342b) (348) (349) (350) (351)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating so	kWh/year (307a) x (307b) x (310a) x (310b) x () (315) (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82 120 369.01	(340b) (342a) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating so	kWh/year (307a) x (307b) x (310a) x (310b) x n) (315) (331) (332) = (340a)(342e) + (345)(354) = heme	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82 120 369.01	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating so Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12) 12b. CO2 Emissions – Community heating	kWh/year (307a) x (307b) x (310a) x (310b) x n) (315) (331) (332) = (340a)(342e) + (345)(354) = heme (355) x (356)] ÷ [(4) + 45.0] =	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82 120 369.01 0.42 1.28 82.14	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (356) (357) (358)
Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating so Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12)	kWh/year (307a) x (307b) x (310a) x (310b) x n) (315) (331) (332) = (340a)(342e) + (345)(354) = heme (355) x (356)] ÷ [(4) + 45.0] =	(Table 12) 2.97	£/year = 8.84 = 84.49 = 8.43 = 80.55 = 1.4 = 21.48 = 43.82 120 369.01	(340b) (342a) (342b) (342b) (348) (349) (350) (351) (355) (356) (357)

		Energy kWh/year	Emission facto kg CO2/kWh	r Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	472.61 ×	0.22	102.08	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	144.62 ×	0.52	-75.06	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP u	sing two fuels repeat (363) to	o (366) for the second for	uel 96.7	(367b)
CO2 associated with heat source 2	2 [(307	o)+(310b)] x 100 ÷ (367b) x	0.22	= 869.46	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 23.22	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(3	72)	945.47	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	nmersion heater or instanta	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		945.47	(376)
CO2 associated with space cooling	J	(315) x	0.52	= 5.5	(377)
CO2 associated with electricity for	pumps and fans within dw	elling (331)) x	0.52	= 84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 172.42	(379)
Total CO2, kg/year	sum of (376)(382) =			1207.91	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			15.88	(384)
El rating (section 14)				86.63	(385)
13b. Primary Energy – Community					
·	heating scheme			20.6	1(361)
Electrical efficiency of CHP unit	heating scheme			30.6	(361)
·	heating scheme	Energy	Primary	63](361)](362)
Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Primary factor		J 7
Electrical efficiency of CHP unit	(307a) × 100 ÷ (362) =			63 P.Energy	J 7
Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	factor	63 P.Energy kWh/year	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year 472.61 ×	factor	63 P.Energy kWh/year 576.58](362)](363)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = −(307a) × (361) ÷ (362) =	kWh/year 472.61	1.22 3.07	63 P.Energy kWh/year 576.58 -443.98](362)](363)](364)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	472.61 X 144.62 X 450.61 X	1.22 3.07 1.22 3.07	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31](362)](363)](364)](365)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP u	kWh/year 472.61	1.22 3.07 1.22 3.07	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31](362)](363)](364)](365)](366)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2	kWh/year 472.61	1.22 3.07 1.22 3.07 0 (366) for the second for	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31 uel 96.7](362)](363)](364)](365)](366)](367b)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2 [(307) on	kWh/year 472.61	1.22 3.07 1.22 3.07 0 (366) for the second for 1.22	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31 uel 96.7 = 4910.81](362)](363)](364)](365)](366)](367b)](368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use 2 [(307) on munity systems	kWh/year 472.61	1.22 3.07 1.22 3.07 0 (366) for the second for 1.22	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31 uel 96.7 = 4910.81 = 137.35](362)](363)](364)](365)](366)](367b)](368)](372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comme	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307a) x (361) ÷ (362) = [(307a) x (361) x (361) ÷ (362) = [(307a) x (361) x (3	kWh/year 472.61	1.22 3.07 1.22 3.07 0 (366) for the second for 1.22	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31 uel 96.7 = 4910.81 = 137.35 = 5307.2](362)](363)](364)](365)](366)](367b)](368)](372)](373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with committee in the interpretation of the interpre	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307) munity systems (unless specified otherwise ting (secondary)	kWh/year 472.61	1.22 3.07 1.22 3.07 0 (366) for the second for 1.22 72)	63 P.Energy kWh/year 576.58 -443.98 549.74 -423.31 uel 96.7 = 4910.81 = 137.35 = 5307.2 5307.2](362)](363)](364)](365)](366)](367b)](368)](372)](373)

Energy associated with space cooling	(315) x		3.07	=	32.52	(377)
Energy associated with electricity for pumps and	fans within dwelling	(331)) x	3.07	=	499.96	(378)
Energy associated with electricity for lighting	(332))) x		3.07	=	1019.91	(379)
Total Primary Energy, kWh/year	sum of (376)(382) =				6859.59	(383)

		User D	etails: _						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa	are Ve	rsion:			0016363 on: 1.0.4.10	
Address :	F	Property i	Address	: Flat 4-′	1-Clean				
1. Overall dwelling dime	ensions:								
_		Area	a(m²)	•	Av. He	ight(m)	_	Volume(m ³	_
Basement		5	4.34	(1a) x	2	2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 5	4.34	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	141.28	(5)
2. Ventilation rate:									
	main seconda heating heating	ry 	other	_	total			m³ per hou	r
Number of chimneys	0 + 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0	= [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns				0	X ·	10 =	0	(7a)
Number of passive vents				Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	x 4	40 =	0	(7c)
				_			Air ch	nanges per ho	our —
•	ys, flues and fans = (6a)+(6b)+(oontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, procee ne dwelling (ns)	ea 10 (17), 0	otriel wise (conunue ir	om (9) to ((16)		0	(9)
Additional infiltration	3 (2)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 foı	r masoni	ry constr	uction			0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value corresponding to	o the great	er wall are	a (after					
•	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	` '	_			0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] + (18)$	•		•	etre of e	envelope	area	3	(17)
· ·	es if a pressurisation test has been do				is being u	sed		0.15	(18)
Number of sides sheltere			,	Í	J			2	(19)
Shelter factor			(20) = 1 -	[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorporat	_		(21) = (18)) x (20) =				0.13	(21)
Infiltration rate modified f		1	T .		T _	T	Ι_	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	- 	1 00	l 0.7		1 40	1 45	1 4 7	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	J	
Wind Factor (22a)m = $(22a)$ m	2)m ÷ 4							_	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2h) _ (22c	a) v Emy (aguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\frac{1}{0} = \frac{2}{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m ²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=			(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

ntilat -	ion hea	t loss ca	alculated	monthly	/			,	(38)m	= 0.33 × (25)m x (5)			
Ļ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(
at tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		_
eat los	ss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	81.67	
)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		_
ımbe	r of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.5	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m=	31	28	31	30	31	30	31	31	30	31	30	31		
_	•		•			•		•			•			
. Wat	ter heat	ing enei	rgy requi	irement:								kWh/ye	ar:	
cuma	ad accu	pancy, l	NI											
				[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		82		
f TF/	A £ 13.9), N = 1												
								(25 x N) to achieve		se target o		7.38		
		_	person per			_	_			g				
Γ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
wate			day for ea		,									
)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
L						!	ı				m(44) ₁₁₂ =		928.53	
ergy co	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
stants	aneous w	ater heati	na at noint	of use (no	hot water	r storaga)	enter () in	boxes (46		Total = Su	m(45) ₁₁₂ =	<u> </u>	1217.45	
г								· · ·	` '	45.47	10.00	40.04		
m= [ater s	18.93 storage	16.56 loss:	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		
omm	nunity h	eating a	ınd no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
nerwi	ise if no	stored	hot wate	er (this in	ıcludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage													
			eclared I		or is kno	wn (kWh	n/day):					0		
•			m Table									0		
			storage				lea access	(48) x (49)) =		1	10		
			eclared of factor fr	-							0	02		
		_	ee secti		- ()	, 0, 0.0	.,,				0.	.02		
	factor	from Ta	ble 2a								1.	.03		
lume	rature fa	actor fro	m Table	2b							0	.6		
		m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		
mper	lost fro										1	00		
mper ergy		54) in (5	55)								١.	.03		
mper ergy nter (50) or (, ,	55) culated f	for each	month			((56)m = (55) × (41)ı	m	1.	03		

	a caroaro	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	loss (an	nual) fro	m Table	3							0		(58)
Primary circuit	•	,			59)m = ((58) ÷ 36	55 × (41)	m				ı	
(modified by	factor fi	om Tabl	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss cal	culated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat requ	uired for	water he	eating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 181.5	160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		(62)
Solar DHW input of	alculated	using App	endix G oı	Appendix	H (negativ	ve quantity	v) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from wa	ater hea	ter											
(64)m= 181.5	160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		
							Outp	out from wa	ater heate	r (annual) ₁	12	1868.29	(64)
Heat gains from	n water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	
(65)m= 86.19	76.65	82.1	75.82	75.91	70.14	69.56	73.3	72.22	78.51	80.22	84.87		(65)
include (57)	n in calc	culation of	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal ga	ins (see	Table 5	and 5a):								-	
Metabolic gain	·												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 109.08	109.08	109.08	109.08	109.08	109.08		J						
Lighting gains	/ooloulo					109.08	109.08	109.08	109.08	109.08	109.08		(66)
<u> </u>	(Calcula	ted in Ap	pendix	_, equati	on L9 or	l		l	109.08	109.08	109.08		(66)
(67)m= 35.32	31.37	ted in Ap 25.51	pendix 19.32	_, equati	on L9 oi	l		l	109.08	109.08	109.08		(66) (67)
	31.37	25.51	19.32	14.44	12.19	r L9a), a 13.17	lso see	Table 5	29.18	<u> </u>			` '
(67)m= 35.32 Appliances gai (68)m= 236.54	31.37	25.51	19.32	14.44	12.19	r L9a), a 13.17	lso see	Table 5 22.98	29.18	<u> </u>			` '
Appliances gai (68)m= 236.54	31.37 ns (calc	25.51 ulated in 232.81	19.32 Append 219.64	14.44 lix L, equ 203.02	12.19 uation L ² 187.4	r L9a), a 13.17 13 or L1 176.96	lso see 17.12 3a), also	Table 5 22.98 see Ta 180.69	29.18 ble 5 193.86	34.05	36.3		(67)
Appliances gai (68)m= 236.54 Cooking gains	31.37 ns (calc	25.51 ulated in 232.81	19.32 Append 219.64	14.44 lix L, equ 203.02	12.19 uation L ² 187.4	r L9a), a 13.17 13 or L1 176.96	lso see 17.12 3a), also	Table 5 22.98 see Ta 180.69	29.18 ble 5 193.86	34.05	36.3		(67)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73	31.37 ns (calc 239 (calcula 47.73	25.51 ulated in 232.81 ted in Ap	19.32 Append 219.64 opendix 47.73	14.44 lix L, equ 203.02 L, equat	12.19 uation L ² 187.4 ion L15	r L9a), a 13.17 13 or L1 176.96 or L15a)	lso see 17.12 3a), also 174.51	Table 5 22.98 see Ta 180.69 ee Table	29.18 ble 5 193.86	34.05	36.3		(67) (68)
Appliances gai (68)m= 236.54 Cooking gains	31.37 ns (calc 239 (calcula 47.73	25.51 ulated in 232.81 ted in Ap	19.32 Append 219.64 opendix 47.73	14.44 lix L, equ 203.02 L, equat	12.19 uation L ² 187.4 ion L15	r L9a), a 13.17 13 or L1 176.96 or L15a)	lso see 17.12 3a), also 174.51	Table 5 22.98 see Ta 180.69 ee Table	29.18 ble 5 193.86	34.05	36.3		(67) (68)
Appliances gains (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0	31.37 ns (calc 239 (calcula 47.73 ns gains 0	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5	19.32 Append 219.64 oppendix 47.73 5a) 0	14.44 dix L, equ 203.02 L, equat 47.73	12.19 uation L ² 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	17.12 3a), also 174.51 , also se 47.73	Table 5 22.98 see Ta 180.69 ee Table 47.73	29.18 ble 5 193.86 5 47.73	34.05 210.48 47.73	36.3 226.11 47.73		(67) (68) (69)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far	31.37 ns (calc 239 (calcula 47.73 ns gains 0	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5	19.32 Append 219.64 oppendix 47.73 5a) 0	14.44 dix L, equ 203.02 L, equat 47.73	12.19 uation L ² 187.4 ion L15 47.73	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	17.12 3a), also 174.51 , also se 47.73	Table 5 22.98 see Ta 180.69 ee Table 47.73	29.18 ble 5 193.86 5 47.73	34.05 210.48 47.73	36.3 226.11 47.73		(67) (68) (69)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0 Losses e.g. ev	31.37 ns (calc 239 (calcula 47.73 ns gains 0 aporatio -72.72	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 n (negat	19.32 Append 219.64 Dependix 47.73 Sa) 0 tive valu	14.44 dix L, equ 203.02 L, equat 47.73 0 es) (Tab	12.19 uation L' 187.4 ion L15 47.73 0 le 5)	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	17.12 3a), also 174.51 , also se 47.73	Table 5	29.18 ble 5 193.86 5 47.73	34.05 210.48 47.73	36.3 226.11 47.73		(67) (68) (69) (70)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -72.72	31.37 ns (calc 239 (calcula 47.73 ns gains 0 aporatio -72.72	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 n (negat	19.32 Append 219.64 Dependix 47.73 Sa) 0 tive valu	14.44 dix L, equ 203.02 L, equat 47.73 0 es) (Tab	12.19 uation L' 187.4 ion L15 47.73 0 le 5)	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73	17.12 3a), also 174.51 , also se 47.73	Table 5	29.18 ble 5 193.86 5 47.73	34.05 210.48 47.73	36.3 226.11 47.73		(67) (68) (69) (70)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -72.72 Water heating	31.37 ns (calc 239 (calcula 47.73 ns gains 0 aporatio -72.72 gains (T 114.06	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 in (negat -72.72 Table 5) 110.35	19.32 Append 219.64 oppendix 47.73 5a) 0 tive valu	14.44 dix L, equat 203.02 L, equat 47.73 0 es) (Tab	12.19 uation L 187.4 ion L15 47.73 0 le 5) -72.72	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 0 -72.72	17.12 3a), also 174.51 1, also se 47.73 0 -72.72	Table 5 22.98 see Ta 180.69 ee Table 47.73 0	29.18 ble 5 193.86 5 47.73 0 -72.72	34.05 210.48 47.73 0 -72.72	36.3 226.11 47.73 0 -72.72		(67) (68) (69) (70) (71)
Appliances gains (68) m= 236.54 Cooking gains (69) m= 47.73 Pumps and far (70) m= 0 Losses e.g. ev (71) m= -72.72 Water heating (72) m= 115.85	31.37 ns (calc 239 (calcula 47.73 ns gains 0 aporatio -72.72 gains (T 114.06	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 on (negat -72.72 Table 5) 110.35	19.32 Append 219.64 oppendix 47.73 5a) 0 tive valu	14.44 dix L, equat 203.02 L, equat 47.73 0 es) (Tab	12.19 uation L 187.4 ion L15 47.73 0 le 5) -72.72	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 0 -72.72	17.12 3a), also 174.51 1, also se 47.73 0 -72.72	Table 5	29.18 ble 5 193.86 5 47.73 0 -72.72	34.05 210.48 47.73 0 -72.72	36.3 226.11 47.73 0 -72.72		(67) (68) (69) (70) (71)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -72.72 Water heating (72)m= 115.85 Total internal	31.37 ns (calc 239 (calcula 47.73 ns gains 0 aporatio -72.72 gains (T 114.06 gains =	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 n (negat -72.72 Table 5) 110.35	19.32 Append 219.64 opendix 47.73 5a) 0 tive valu -72.72	14.44 dix L, equat 203.02 L, equat 47.73 0 es) (Tab -72.72	12.19 uation L ² 187.4 ion L15 47.73 0 le 5) -72.72 97.41 (66)	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 0 -72.72 93.49 m + (67)m	lso see 17.12 3a), also 174.51 , also se 47.73 0 -72.72 98.52	Table 5 22.98 2 see Ta 180.69 2 ee Table 47.73 0 -72.72 100.3 (69)m + (29.18 ble 5 193.86 5 47.73 0 -72.72 105.52 (70)m + (7	34.05 210.48 47.73 0 -72.72 111.42 1)m + (72)	36.3 226.11 47.73 0 -72.72 114.07		(67) (68) (69) (70) (71) (72)
Appliances gai (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -72.72 Water heating (72)m= 115.85 Total internal (73)m= 471.8	31.37 ns (calcomplete (calcula 47.73) ns gains 0 aporation -72.72 gains (Tal.06) gains = 468.52	25.51 ulated in 232.81 ted in Ap 47.73 (Table 5 0 on (negat -72.72 Table 5) 110.35	19.32 Append 219.64 Appendix 47.73 Sa) 0 tive valu -72.72 105.3	14.44 dix L, equal 203.02 L, equal 47.73 0 es) (Tab -72.72	12.19 uation L ² 187.4 ion L15 47.73 0 le 5) -72.72 97.41 (66) 381.09	r L9a), a 13.17 13 or L1 176.96 or L15a) 47.73 0 -72.72 93.49 m + (67)m 367.71	17.12 3a), also 174.51 1, also se 47.73 0 -72.72 98.52 1+ (68)m+ 374.23	Table 5 22.98 2 see Ta 180.69 2 ee Table 47.73 0 -72.72 100.3 (69)m + (69)m	29.18 ble 5 193.86 5 47.73 0 -72.72 105.52 (70)m + (7 412.65	34.05 210.48 47.73 0 -72.72 111.42 1)m + (72) 440.04	36.3 226.11 47.73 0 -72.72 114.07		(67) (68) (69) (70) (71) (72)

Table 6a

Table 6b

Table 6c

m²

Table 6d

(W)

N. 11		7		1			_						_
Northeast _{0.9x}	0.77	X	7.15	Х	11.28	×	` <u>لــــ</u>	0.24	x	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.97	,	۱ <u> </u>	0.24	x	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	X	7.15	X	41.38	X	٠ <u> </u>	0.24	x	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	X	7.15	X	67.96	×	٠	0.24	x	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	X	7.15	X	91.35	Х	(0.24	х	0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	X	7.15	X	97.38	Х	(0.24	x	0.7	=	162.13	(75)
Northeast 0.9x	0.77	X	7.15	x	91.1	×	(0.24	x	0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	X	7.15	x	72.63	Х		0.24	x [0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	X	7.15	x	50.42	Х		0.24	x	0.7	=	83.94	(75)
Northeast _{0.9x}	0.77	X	7.15	x	28.07	Х	(0.24	x [0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	X	7.15	x	14.2	Х	(0.24	x [0.7	=	23.64	(75)
Northeast _{0.9x}	0.77	X	7.15	х	9.21	Х	(0.24	х	0.7	=	15.34	(75)
Southwest _{0.9x}	0.77	x	2.19	x	36.79			0.24	x	0.7	=	9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.79			0.24	x	0.7	=	3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	x	62.67			0.24	x	0.7		15.98	(79)
Southwest _{0.9x}	0.77	X	0.75	x	62.67			0.24	_ x [0.7		5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	x	85.75			0.24	= x [0.7	=	21.86	(79)
Southwest _{0.9x}	0.77	X	0.75	x	85.75			0.24	= x	0.7		7.49	(79)
Southwest _{0.9x}	0.77	X	2.19	x	106.25			0.24	= x [0.7	=	27.09	(79)
Southwest _{0.9x}	0.77	x	0.75	x	106.25			0.24	= x [0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	×	2.19	x	119.01			0.24	_ x [0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	×	0.75	x	119.01			0.24	_ x [0.7		10.39	(79)
Southwest _{0.9x}	0.77	X	2.19	х	118.15			0.24	x	0.7	=	30.12	(79)
Southwest _{0.9x}	0.77	X	0.75	x	118.15			0.24	x	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	X	2.19	x	113.91			0.24	x	0.7	=	29.04	(79)
Southwest _{0.9x}	0.77	X	0.75	x	113.91			0.24	x	0.7	=	9.95	(79)
Southwest _{0.9x}	0.77	X	2.19	x	104.39			0.24	x [0.7	=	26.62	(79)
Southwest _{0.9x}	0.77	X	0.75	x	104.39			0.24	x	0.7	=	9.12	(79)
Southwest _{0.9x}	0.77	X	2.19	x	92.85			0.24	х	0.7	=	23.67	(79)
Southwest _{0.9x}	0.77	X	0.75	x	92.85			0.24	x	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	X	2.19	x	69.27			0.24	x	0.7	=	17.66	(79)
Southwest _{0.9x}	0.77	X	0.75	X	69.27			0.24	x	0.7	=	6.05	(79)
Southwest _{0.9x}	0.77	X	2.19	X	44.07			0.24	x [0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	X	0.75	X	44.07			0.24	x [0.7	=	3.85	(79)
Southwest _{0.9x}	0.77	X	2.19	X	31.49			0.24	x	0.7	=	8.03	(79)
Southwest _{0.9x}	0.77	X	0.75	X	31.49			0.24	X	0.7	=	2.75	(79)
Solar gains in wa					00 57 400			um(74)m		T 00.70		1	(02)
(83)m= 31.38 Total gains – into		.24 solar	$\begin{array}{c c} 149.51 & 192.8 \\ \hline (84)m = (73)n \end{array}$		02.57 190.		56.65	115.73	70.44	38.72	26.12		(83)
		51 solal	577.85 596.3	<u> </u>	83.66 558.		30.88	503.78	483.09	478.77	486.68	1	(84)
` '					00.00 000.	.57 3.	50.00	303.70	400.00	470.77	+00.00	l	(01)
7. Mean interna					oroc frame	Tab!-	O TI	1 (00)				2:	(05)
Temperature d	•	•		•			ษ, In	1 (10)				21	(85)
Utilisation facto				Ť			Διια	Sep	Oct	Nov	Dec	I	
Stroma FSAP 2012	Version! 1.d.	496 (9	SAP 19.192] - http://	<u>ww</u> .	<u>stromal.com</u>	41 <u> </u>	Aug	l oeb	OCI	INOV	Dec	l Page	5 of 9

(86)m=	0.99	0.99	0.98	0.95	0.89	0.75	0.6	0.64	0.84	0.95	0.98	0.99		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.57	19.69	19.93	20.29	20.63	20.87	20.96	20.95	20.78	20.37	19.92	19.54		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.67	19.67	19.67	19.68	19.69	19.7	19.7	19.7	19.69	19.69	19.68	19.68		(88)
l Itilies	ation fac	tor for a	ains for	rest of d	welling	h2 m (se	ee Table	(a)					l	
(89)m=	0.99	0.98	0.97	0.93	0.84	0.65	0.44	0.49	0.76	0.93	0.98	0.99		(89)
			l .	<u> </u>		L TO //	. !!	0 42 :		L 0 = \	<u> </u>			
(90)m=	17.83	18.01	18.36	18.87	19.32	ng 12 (f	ollow ste	19.68	7 IN Tabi	18.99	18.35	17.8		(90)
(90)111=	17.03	10.01	10.30	10.07	19.32	19.01	19.00	19.00		fLA = Livin			0.25	(91)
										IL/ (— LIVII)	g aroa . (0.25	(91)
			· `	ı	i	· · · · ·	LA × T1	+ (1 – fL	r			1	Ī	
(92)m=	18.27	18.43	18.76	19.22	19.65	19.93	20	20	19.84	19.34	18.74	18.24		(92)
			r	r		r	m Table			ri — —		1	I	(00)
(93)m=	18.27	18.43	18.76	19.22	19.65	19.93	20	20	19.84	19.34	18.74	18.24		(93)
•			uirement							. —.				
			ernal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	it Ti,m=(76)m an	d re-calc	culate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>	ividy	Odii	l oai		_ ССР	1 000	1101	_ DC0		
(94)m=	0.98	0.97	0.96	0.92	0.84	0.67	0.48	0.53	0.77	0.92	0.97	0.98		(94)
	∟∟∟⊔ ıl ɑains.	hmGm	, W = (94	1	L 4)m	l	l	l	l		l			
(95)m=		514.45	528.47	532.26	498.22	389.66	267.31	278.75	388.38	446.18	463.87	478.11		(95)
Montl	hly avera	age exte	rnal tem	perature	from Ta	able 8	l	l	l	<u> </u>	l	<u> </u>		
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm,W =	=[(39)m :	x [(93)m	– (96)m	1 1	!			
(97)m=			1010.41		648.39	430.65	275.12	290.2	465.43	712.67	952.61	1153.06		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95	o)m] x (4	1)m			
(98)m=	492.85	405.14	358.56	224	111.73	0	0	0	0	198.27	351.9	502.16		
								Tota	l per year	(kWh/year	·) = Sum(9	8) _{15,912} =	2644.61	(98)
Spac	e heatin	a require	ement in	kWh/m²	²/vear								48.67	(99)
•		• ,			, y ou.								10.07	
		Ĭ	quiremer		O T-I	-1- 40-								
Caicu	Jan	r June, c Feb	July and Mar	August. Apr	See Tai	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat				<u> </u>					<u> </u>	<u> </u>		able 10)		
(100)m=		0	0	0	0	759.65	598.02	613.05	0	0	0	0		(100)
	ation fac		<u> </u>											, ,
(101)m=		0	0	0	0	0.71	0.8	0.76	0	0	0	0		(101)
		mLm (V	ı √atts) = ((100)m x	(101)m	<u> </u>	l	l	l		l			
(102)m=		0	0	0	0	542.27	478.02	468.69	0	0	0	0		(102)
Gains	s (solar o	gains ca	ı lculated	ror appli	cable w	eather re	egion, se	e Table	10)	!	l	<u> </u>		
(103)m=	<u> </u>	0	0	0	0	617.86	590.56	557.32	0	0	0	0		(103)
		g require	ement fo	r month.	whole o	lwelling.	continu	ous (kW	h = 0.0	24 x [(10)3)m – (102)m] :	x (41)m	
			104)m <				_	<u> </u>			, \	, ,		
(104)m=	0	0	0	0	0	0	83.73	65.94	0	0	0	0		
									Total	I = Sum(104)	=	149.67	(104)

On the differentials										4)		(405)
Cooled fraction Intermittency factor (Table 10b)					1 C =	cooled	area ÷ (4) =	0.7	(105)
(106)m = 0 0	0	0	0	0.25	0.25	0.25	0	0	0	0		
Chara cooling requir	omant for	manth	(101)m	(10F)	(106)	_	Tota	I = Sum	(104)	=	0	(106)
Space cooling require (107)m= 0 0		0	0	x (105)	14.64	11.53	0	0	0	0	1	
L L	•	l		ļ.	l	!	Tota	l = Sum((107)	=	26.17	(107)
Space cooling require	ement in k	kWh/m²/	year				(107) ÷ (4) =			0.48	(108)
9b. Energy requirement												
This part is used for s Fraction of space hea									unity so	heme.	0	(301)
Fraction of space hea	at from co	mmunity	/ system	1 – (30	1) =						1	(302)
The community scheme mincludes boilers, heat pum	-							up to four	other hea	t sources;	the latter	
Fraction of heat from	Commun	ity CHP									0.13	(303a)
Fraction of communit	y heat fro	m heat s	source 2								0.87	(303b)
Fraction of total space	e heat fro	m Comn	nunity C	HP				(3	802) x (30	3a) =	0.13	(304a)
Fraction of total space	e heat fro	m comm	nunity he	at sourc	e 2			(3	802) x (30	3b) =	0.87	(304b)
Factor for control and	d charging	method	l (Table	4c(3)) fo	r comm	unity hea	ting sys	tem			1	(305)
Distribution loss facto	or (Table 1	(2c) for (commun	ity hoatii	na eveta	m					1.05	(306)
	•	- /	Jonnan	ity neath	ig syste	111					1.05	(300)
Space heating	·	·	oomman	ity ricatii	ig syste	111					kWh/ye	
Annual space heating	g requirem	nent	oonman.	ity fieatii	ig syste	111					kWh/ye 2644.61	ar
Annual space heating Space heat from Cor	g requirem	nent :HP		ny mean	ig syste	111	(98) x (3	04a) x (30	5) x (306)	=	kWh/ye	
Annual space heating	g requirem	nent :HP	oon ma	ny neam	ig syste		`	04a) x (30 04b) x (30	, , ,		kWh/ye 2644.61	ar
Annual space heating Space heat from Cor	g requirem nmunity C t source 2	nent HP					(98) x (3	04b) x (30	5) x (306)		kWh/ye 2644.61 360.99	(307a)
Annual space heating Space heat from Cor Space heat from hea	g requirem mmunity C t source 2 ary/supple	nent HP mentary	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30	5) x (306)		kWh/ye 2644.61 360.99 2415.86	(307a) (307b)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating	g requirem nmunity C t source 2 ary/supple ement from	nent HP mentary m secon	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30 Appendix	5) x (306)		kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating	g requirem nmunity C t source 2 ary/supple ement from g requirem	nent HP mentary m secon	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30 Appendix	5) x (306)		kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating	g requirem mmunity C t source 2 ary/supple ement from g requirem nity schem	nent HP mentary m secon ent	heating	system	in % (fro	om Table	(98) x (36 4a or A (98) x (36	04b) x (30 Appendix	5) x (306) x E) ÷ (308) =	=	kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from communications	g requirement source 2 erry/supple ement from requirement schement munity C	ment HP mentary m secon ent ne: HP	heating	system	in % (fro	om Table	(98) x (36 4a or A (98) x (36 (64) x (36	04b) x (30 appendix 01) x 100	5) x (306) (E) ÷ (308) =	=	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29	(307a) (307b) (308 (309)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from community Water heat from Core	g requirement source 2 ary/supple ement from g requiremently schement munity C t source 2	nent HP mentary m secon ent ne:	heating	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29	(307a) (307b) (308 (309) (310a)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat	g requirement source 2 ary/supple ement from the prequirement from the prequirement of the source 2 art distributed	ment HP mentary m secon ent ne: HP	r heating ndary/sup	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68	(307a) (307b) (308 (309) (310a) (310b)
Annual space heating Space heat from Cor Space heat from hea Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he	g requirement source 2 ary/supple ement from the prequirement munity Control to source 2 art distributes	ment HP mentary m secon ent he: HP ution ncy Rati	heating ndary/sup	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39	(307a) (307b) (308 (309) (310a) (310b) (313)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for heat Cooling System Ener	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 3 to source 3 to source 4 to source 4 to source 4 to source 5 to source 5 to source 6 to source 6 to source 6 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 7 to source 8 to source 9 to sour	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73	(307a) (307b) (308 (309) (310a) (310b) (313) (314)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if ther Electricity for pumps	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 eat distribute gy Efficiente is a fixed and fans with a balance.	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if there Electricity for pumps mechanical ventilation	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 eat distribute gy Efficiente is a fixed and fans with the present t	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if there Electricity for pumps mechanical ventilation warm air heating system	g requirement source 2 ary/supple ement from the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source and fans the source of the sou	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy ed, extra	o g systen welling (T	system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36) 4a or A (98) x (36) (64) x (36) (64) x (36) x [(307a) = (107) =	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) 5) x (308) = 5) x (306) 5) x (306) 10 + (310a)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54 90.49 0	(307a) (307b) (308 (308) (309) (310a) (310b) (313) (314) (315) (330a) (330b)

Energy for lighting (calculated in Appendix L)			249.52 (332)
10b. Fuel costs – Community heating scher	ne		
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating from CHP	(307a) x	2.97 x 0.01 =	10.72 (340a)
Space heating from heat source 2	(307b) x	4.24 × 0.01 =	102.43 (340b)
Water heating from CHP	(310a) x	2.97 x 0.01 =	7.57 (342a)
Water heating from heat source 2	(310b) x	4.24 × 0.01 =	72.36 (342b)
		Fuel Price	
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	0.75
Pumps and fans	(331)	13.19 × 0.01 =	11.94 (349)
Energy for lighting	(332)	13.19 x 0.01 =	32.91 (350)
Additional standing charges (Table 12)			120 (351)
Total energy cost = (34	0a)(342e) + (345)(354) =		358.67 (355)
11b. SAP rating - Community heating scher	ne		
Energy cost deflator (Table 12)			0.42 (356)
Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] =		1.52 (357)
SAP rating (section12)			78.85 (358)
12b. CO2 Emissions – Community heating se	cheme		
Electrical efficiency of CHP unit			30.6 (361)
Heat efficiency of CHP unit			63 (362)
	Energy kWh/ye		r Emissions kg CO2/year
Space heating from CHP) (307a) x 1	00 ÷ (362) = 573	x 0.22	123.77 (363)
less credit emissions for electricity $-(307a) \times$	(361) ÷ (362) = 175.3	34 × 0.52	-91 (364)
Water heated by CHP (310a) x 1	00 ÷ (362) = 404.8	8 X 0.22	87.44 (365)
less credit emissions for electricity $-(310a) \times$	(361) ÷ (362) = 123.8	37 × 0.52	-64.29 (366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repo	eat (363) to (366) for the second for	96.7 (367b)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 -	÷ (367b) x 0.22	= 920.86 (368)
Electrical energy for heat distribution	[(313) x	0.52	= 24.59 (372)
Total CO2 associated with community system	ns (363)(366) +	- (368)(372)	= 1001.37 (373)
CO2 associated with space heating (secondary	ary) (309) x	0	= 0 (374)
CO2 associated with water from immersion h	eater or instantaneous heater	(312) x 0.22	= 0 (375)
Total CO2 associated with space and water I			
Total 002 accordice with opace and water i	neating (373) + (374) +	+ (375) =	1001.37 (376)
CO2 associated with space cooling	neating (373) + (374) + (315) x	+ (375) =	=
·	(315) x		

CO2 associated with electricity for l	ighting	(332))) x	0.52	= [129.5	(379)
Total CO2, kg/year	sum of (376)(382) =				1180.71	(383)
Dwelling CO2 Emission Rat	e $(383) \div (4) =$				21.73	(384)
El rating (section 14)					84.07	(385)
13b. Primary Energy – Community	heating scheme					
Electrical efficiency of CHP unit					30.6	(361)
Heat efficiency of CHP unit					63	(362)
		Energy kWh/year	Primary factor		Energy /h/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	573 ×	1.22	[699.06	(363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	175.34 ×	3.07	[-538.29	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	404.8 ×	1.22	[493.85	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	123.87 ×	3.07	[-380.27	(366)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) to	o (366) for the secon	d fuel	96.7	(367b)
Energy associated with heat source	2 [(307b	y)+(310b)] x 100 ÷ (367b) x	1.22	= [5201.13	(368)
Electrical energy for heat distributio	n	[(313) x		= [145.47	(372)
Total Energy associated with comm	nunity systems	(363)(366) + (368)(37	72)	= [5620.95	(373)
if it is negative set (373) to zero (unless specified otherwise	, see C7 in Appendix (C)	[5620.95	(373)
Energy associated with space heati	ng (secondary)	(309) x	0	= [0	(374)
Energy associated with water from	immersion heater or instar	ntaneous heater(312) x	1.22	= [0	(375)
Total Energy associated with space	and water heating	(373) + (374) + (375) =		[5620.95	(376)
Energy associated with space cooli	ng	(315) x	3.07	= [17	(377)
Energy associated with electricity for	or pumps and fans within d	welling (331)) x	3.07	= [277.81	(378)
Energy associated with electricity for	or lighting	(332))) x	3.07	= [766.03	(379)
Total Primary Energy, kWh/	year sum of (376	s)(382) =			6681.8	(383)

					User [Details:						
Assessor Name: Software Name:		Hockne na FSAP		2		Strom Softwa					016363 on: 1.0.4.10	
				Р	roperty	Address	: Flat 4-2	2-Clean				
Address :												
Overall dwelling dir	mensions:				۸ra	a(m²)		Av. Hei	iaht(m)		Volume(m³)	
Basement							(1a) x		2.6	(2a) =	144.59	(3a)
Total floor area TFA =	(1a)+(1b)+	-(1c)+(1d))+(1e)+(1r			(4)]` ′		」 ` ′
Dwelling volume	(14)	(10)1(10)	, . (. •	,	·/ L	33.01)+(3c)+(3d	1)+(3e)+	(3n) =	444.50	٦(5)
-							(00) (00))	,, (00)	.(011)	144.59	(5)
2. Ventilation rate:	ma	ain	Se	econdar	'V	other		total			m³ per hour	
Number of chimneys	hea	ating		eating	, +		7 = [10 =	-	_
•	<u> </u>		느느	0	╛╘	0	╛╘	0		20 =	0	(6a)
Number of open flues		0	+ L	0	+	0] = [0			0	(6b)
Number of intermittent							L	0	x ′	0 =	0	(7a)
Number of passive ver	nts							0	X ′	0 =	0	(7b)
Number of flueless gas	s fires							0	X 4	10 =	0	(7c)
										A in a la	angaa nar ha	
			(0	-) - (Ob.) - (T		(7 -)	_			1	anges per ho	_
Infiltration due to chimi	•						continue fr	0 rom (9) to (÷ (5) =	0	(8)
Number of storeys in			nenae	и, ргосее	u 10 (17),	Ourier wise (onunae n	om (3) to (10)		0	(9)
Additional infiltration		3 ()							[(9)-	1]x0.1 =	0	(10)
Structural infiltration	: 0.25 for st	teel or tim	nber f	rame or	0.35 fc	r masoni	y constr	ruction			0	(11)
if both types of wall are	•			ponding to	the grea	ter wall are	a (after			·		_
deducting areas of ope If suspended woode	<i>3 // 1</i>			ed) or 0	.1 (seal	ed). else	enter 0				0	(12)
If no draught lobby,		,		,	(/,					0	(13)
Percentage of windo	ws and do	ors draug	ght st	ripped							0	(14)
Window infiltration						0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate						(8) + (10)	+ (11) + (1	12) + (13) -	+ (15) =		0	(16)
Air permeability valu						•	•	etre of e	nvelope	area	3	(17)
If based on air permea	•	•						. , .	,		0.15	(18)
Air permeability value app Number of sides shelte		surisation te	est nas	s been dor	ne or a de	gree air pe	rmeability	is being us	sea		3	(19)
Shelter factor	Sicu					(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorpo	rating shelt	ter factor				(21) = (18) x (20) =				0.12	(21)
Infiltration rate modifie	d for month	hly wind s	peed	I								_
Jan Feb	Mar	Apr N	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind	speed from	n Table 7										
(22)m= 5.1 5	4.9	4.4	1.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Footor (22a)=	(22)~ . 4											
Wind Factor $(22a)m = (22a)m = 1.27 1.25$	ì í	1.1 1	.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(224)1117 1.25	1.23	1.1 1	.00	0.95	J 0.95	1 0.92	'	1.08	I 1.12	1.10		

0.15	ation rate	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effe		-	rate for t	he appli	cable ca	se	ļ		<u>!</u>	<u>!</u>			
If mechanic												0.5	(2
If exhaust air h) = (23a)			0.5	(2
If balanced with	n heat reco	very: effici	ency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				76.5	(2
a) If balance				1		- ` ` 	- 	í `	- ^ `) ÷ 100]	
24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(2
b) If balance	1		ı	1		<u> </u>	É È	``	- ` `	- 	1	7	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
c) If whole h	nouse ext			•	•				.5 × (23b	o)		_	
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r	ventilation $n = 1$, the				•				0.5]			_	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)					
25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
3. Heat losse	s and he	at loss p	paramete	er:									
LEMENT	Gros area	-	Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-valu kJ/m²·		A X k kJ/K
Ooors					2.6	X	1.2		3.12				(2
Vindows Type	e 1				7.15	x1.	/[1/(1.2)+	0.04] =	8.19				(2
Vindows Type	∍ 2				2.19	x1	/[1/(1.2)+	0.04] =	2.51				(2
Vindows Type	∍ 3				0.75	x1	/[1/(1.2)+	0.04] =	0.86				(2
Valls Type1	34.6	6	17.24	4	17.42	2 x	0.15		2.61				(2
			17.2		17.42		0.10	-					
• •	23.9	2	2.6		21.32	2 X		=	3.2	F i			(2
Valls Type2	23.9					_		=					=
Valls Type2 Valls Type3		3	2.6		21.32	x	0.15	=	3.2				(2
Valls Type2 Valls Type3 Valls Type4 Roof	2.63	3	2.6		21.32	x x x	0.15	=	3.2 0.39				(2)
Valls Type3 Valls Type4 Roof	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13	x 3 x 1 x	0.15 0.15 0.15	= = =	3.2 0.39 3.77				(2
Valls Type2 Valls Type3 Valls Type4	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13 55.6	x 3 x 1 x	0.15 0.15 0.15	= = =	3.2 0.39 3.77				(2
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e	2.63 25.1 55.6	3 3 51	2.6 0		21.32 2.63 25.13 55.6 ² 141.9	x x 33 x x 11 x x 55 x	0.15 0.15 0.15 0.15	=	3.2 0.39 3.77 8.34				(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of earty wall Party floor for windows and	2.63 25.1: 55.6 elements,	3 3 3 51 , m ²	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x x 3 x 1 x x 5 x x 1	0.15 0.15 0.15 0.15	= = = = = = = = = = = = = = = = = = = =	3.2 0.39 3.77 8.34	as given ir	n paragrapa	h 3.2	(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and * include the area	2.63 25.1: 55.6 elements,	3 3 3 in the state of the state	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15	= = = =	3.2 0.39 3.77 8.34	as given ir	n paragrap	h 3.2	(2)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e	2.63 25.1: 55.6 elements, d roof windo	3 3 3 3 3 3 3 51 , m² cows, use e sides of in = S (A x	2.6 0 0 0		21.32 2.63 25.13 55.6 141.9 7.81 55.6	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15 0.17	= = = = 	3.2 0.39 3.77 8.34				(3) (3) (3) (3)
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and * include the area Tabric heat los	2.63 25.11 55.6 elements, d roof windown windo	3 3 3 3 in m ² ows, use e sides of in me = S (A x K)	2.6 0 0 0 stiffective with atternal walk	ls and pan	21.32 2.63 25.13 55.67 141.9 7.81 55.67 alue calculatitions	x 3 x 1 x 15 x 1 lated using	0.15 0.15 0.15 0.15 0.17	= = = = 	3.2 0.39 3.77 8.34 0	2) + (32a)		41.18	
Valls Type2 Valls Type3 Valls Type4 Roof Total area of e Party wall Party floor for windows and the include the area Tabric heat loss Heat capacity	2.63 25.1: 55.6 belements, d roof windown as on both as s, W/K = Cm = S(A) s parameters when	3 3 3 3 3 3 51 , m² ows, use e sides of in a sides of in	2.6 0 0 0 offective with ternal walk U) $P = Cm \div tails of the$	ls and pan	21.32 2.63 25.13 55.6 ² 141.9 7.81 55.6 ³ alue calculatitions	x 3 x 1 x 5 x 1 lated using	0.15 0.15 0.15 0.15 0.16 0.17 0.17 0.18 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19	= = = = 	3.2 0.39 3.77 8.34 0 0 ue)+0.04] a	2) + (32a) : Medium	(32e) =	41.18	(2)

												_
Total fabric heat							` '	(36) =			69.75	(37)
Ventilation heat I		·	í	T	T	1			25)m x (5)		1	
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m= 12.68	12.54 12.4	11.71	11.57	10.88	10.88	10.74	11.15	11.57	11.85	12.12		(38)
Heat transfer coe							(39)m	= (37) + (3	38)m		1	
(39)m= 82.42	82.28 82.15	81.45	81.31	80.62	80.62	80.48	80.9	81.31	81.59	81.87		¬(00)
Heat loss param	eter (HLP). W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	.12 /12=	81.42	(39)
	1.48 1.48	1.46	1.46	1.45	1.45	1.45	1.45	1.46	1.47	1.47		
	<u>!</u>		<u> </u>	<u> </u>	<u> </u>		,	Average =	Sum(40) _{1.}	.12 /12=	1.46	(40)
Number of days	in month (Tab	le 1a)										_
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28 31	30	31	30	31	31	30	31	30	31		(41)
4. Water heating	g energy requ	irement:								kWh/ye	ear:	
Assumed occupa	ancv N								1	86		(42)
if TFA > 13.9,	• •	(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	013 x (ΓFA -13.		00		(42)
if TFA £ 13.9,						(O= 11)					ı	
Annual average Reduce the annual a								se target o		.26		(43)
not more that 125 litr								J				
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in li	tres per day for e	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					l	
(44)m= 86.09	82.96 79.83	76.7	73.57	70.44	70.44	73.57	76.7	79.83	82.96	86.09		
				400 1/4		T /000			m(44) ₁₁₂ =		939.13	(44)
Energy content of ho				1	ı			,	1	,	ı	
(45)m= 127.67 1	111.66 115.22	100.45	96.39	83.17	77.07	88.44	89.5	104.3	113.85	123.64		7(45)
If instantaneous water	er heating at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46)		Γotal = Su	m(45) ₁₁₂ =		1231.35	(45)
(46)m= 19.15	16.75 17.28	15.07	14.46	12.48	11.56	13.27	13.42	15.65	17.08	18.55		(46)
Water storage lo	I											, ,
Storage volume	(litres) includir	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel)		(47)
If community hea	ating and no ta	ank in dw	velling, e	nter 110	litres in	(47)						
Otherwise if no s		er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage lo a) If manufacture		nee fact	or ie kna	wn (k\//k	2/d2v/):						[(40)
Temperature fac			JI IS KIIO	wii (Kvvi	i/uay).)		(48)
Energy lost from			oor			(48) x (49)	_			0		(49)
b) If manufactur	_	-		or is not		(46) X (49)	_		1	10		(50)
Hot water storag		-							0.	02		(51)
If community hea	•	on 4.3										
Volume factor from		O.L.							1.	03		(52)
Temperature fac									0	.6		(53)
Energy lost from	_	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =	-	03		(54)
Enter (50) or (54	+) 111 (33)								1.	03		(55)

Water storag	e loss ca	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	3	=	-	=				0		(58)
Primary circu	•	•			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat re	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 182.9 ⁴	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		(62)
Solar DHW inpu	t calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add addition	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	iter	-		-	_	-			-	-		
(64)m= 182.94	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		
	•	•			•		Outp	out from wa	ater heate	r (annual)₁	12	1882.19	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 86.67	77.07	82.53	76.2	76.27	70.45	00.05	ı			1	1		(05)
	1	02.00	10.2	10.21	70.45	69.85	73.63	72.55	78.9	80.65	85.33		(65)
include (57			<u> </u>		<u> </u>		!					eating	(65)
)m in cal	culation o	of (65)m	only if c	<u> </u>		!					eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	<u> </u>		!					eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	<u> </u>		!					eating	(65)
include (57 5. Internal of Metabolic ga	gains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i:	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
include (57 5. Internal of Metabolic ga	gains (see	culation of the culation of th	of (65)m 5 and 5a ts Apr 111.31	only if c : : : : : : : : : : : : : : : : : : :	ylinder i: Jun 111.31	Jul	Aug 111.31	Sep	ater is fr	om com	munity h	eating	
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3	gains (see	culation of the culation of th	of (65)m 5 and 5a ts Apr 111.31	only if c : : : : : : : : : : : : : : : : : : :	ylinder i: Jun 111.31	Jul	Aug 111.31	Sep	ater is fr	om com	munity h	eating	
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05	gains (see fins (Table Feb 111.31 s (calcula 32.02	Table 5 E Table 5 E 5), Wat Mar 111.31 tted in Ap 26.04	of (65)m 6 and 5a ts Apr 111.31 opendix 19.71	May 111.31 L, equat	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3	r)m in calcalant (see	Table 5 E Table 5 E 5), Wat Mar 111.31 tted in Ap 26.04	of (65)m 6 and 5a ts Apr 111.31 opendix 19.71	May 111.31 L, equat	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g	r)m in calcalant (see fins (Table Feb 111.31 s (calcula 32.02 ains (calcula 243.93	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	May 111.31 L, equat 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Ta 184.42	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3 Lighting gain (67)m= 36.05 Appliances g (68)m= 241.43	m in calculation in c	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	May 111.31 L, equat 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Ta 184.42	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
include (57) 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain	r)m in calculations (Table Feb 111.31 s (calculations (cal	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62 ated in Ap 47.99	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
include (57) 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain (69)m= 47.99	r)m in calculations (Table Feb 111.31 s (calculations (cal	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 culated in 237.62 ated in Ap 47.99	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3 Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4 Cooking gain (69)m= 47.99 Pumps and fa	min calcular sections (Table Feb 111.31 sections (calcular 32.02 sections (calcular 47.99 sense gains of the sections of the s	culation of the culation of th	of (65)m 5 and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0	only if controls: May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57) 5. Internal (57) Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain (69)m= 47.99 Pumps and fi (70)m= 0	r)m in calculations (Table Feb 111.31 s (calculations (cal	culation of the culation of th	of (65)m 5 and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0	only if controls: May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain (69)m= 47.99 Pumps and fi (70)m= 0 Losses e.g. 6	r)m in calculations (Table Feb 111.31 s (calculations) (calculatio	culation of the culation of the culation of the culation of the culated in Applicated	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu	only if constructions: May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat 47.99 0 es) (Tab	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5)	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77 47.99	eating	(66) (67) (68) (69)
include (57 5. Internal (57 5. Internal (57 Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain (69)m= 47.99 Pumps and fi (70)m= 0 Losses e.g. 6 (71)m= -74.21	min calculations (Table Feb 111.31 s (calculations (calcul	culation of the culation of the culation of the culation of the culated in Applicated	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu	only if constructions: May 111.31 L, equat 14.74 dix L, eq 207.21 L, equat 47.99 0 es) (Tab	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5)	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11), also se 47.99	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77 47.99	eating	(66) (67) (68) (69)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3 Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4 Cooking gain (69)m= 47.99 Pumps and fi (70)m= 0 Losses e.g. 6 (71)m= -74.21 Water heatin	r)m in calculations (Table Feb 111.31 s (calculations) (calculatio	culation of the culation of th	of (65)m c and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 0, also se 47.99 0	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99 0 -74.21	Oct 111.31 29.78 ble 5 197.86 5 47.99 0 -74.21	Nov 111.31 34.76 214.83 47.99 0	Dec 111.31 37.05 230.77 47.99 0	eating	(66) (67) (68) (69) (70)
include (57 5. Internal (Metabolic ga Jan (66)m= 111.3° Lighting gain (67)m= 36.05 Appliances g (68)m= 241.4° Cooking gain (69)m= 47.99 Pumps and fi (70)m= 0 Losses e.g. 6 (71)m= -74.21 Water heatin (72)m= 116.49	min calcons (Table Feb 111.31 s (calcula 32.02 ains (calcula 47.99 ains gains (-74.21 g gains (Table 114.68 all gains =	culation of the culation of th	of (65)m c and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 0, also se 47.99 0	Sep 111.31 Table 5 23.45 see Ta 184.42 ee Table 47.99 0 -74.21	Oct 111.31 29.78 ble 5 197.86 5 47.99 0 -74.21	Nov 111.31 34.76 214.83 47.99 0	Dec 111.31 37.05 230.77 47.99 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b	٦	FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	7.15	x	11.28	x	0.24	x [0.7	=	18.78	(75)
Northeast 0.9x 0.77	x	7.15	x	22.97	x	0.24	x [0.7	=	38.24	(75)
Northeast 0.9x 0.77	X	7.15	x	41.38	x	0.24	x	0.7	=	68.89	(75)
Northeast 0.9x 0.77	x	7.15	х	67.96	х	0.24	x	0.7	=	113.14	(75)
Northeast 0.9x 0.77	X	7.15	x	91.35	X	0.24	x	0.7	=	152.08	(75)
Northeast 0.9x 0.77	X	7.15	x	97.38	x	0.24	x	0.7	=	162.13	(75)
Northeast 0.9x 0.77	X	7.15	x	91.1	х	0.24	x	0.7	=	151.67	(75)
Northeast 0.9x 0.77	X	7.15	х	72.63	X	0.24	x	0.7	=	120.91	(75)
Northeast 0.9x 0.77	x	7.15	x	50.42	x	0.24	x	0.7	=	83.94	(75)
Northeast 0.9x 0.77	x	7.15	x	28.07	x	0.24	x	0.7	=	46.73	(75)
Northeast 0.9x 0.77	x	7.15	x	14.2	x	0.24	x	0.7	=	23.64	(75)
Northeast 0.9x 0.77	X	7.15	x	9.21	x	0.24	_ x [0.7		15.34	(75)
Southwest _{0.9x} 0.77	X	2.19	x	36.79	ĺ	0.24	x	0.7	=	9.38	(79)
Southwest _{0.9x} 0.77	x	0.75	x	36.79	ĺ	0.24	_ x [0.7	=	3.21	(79)
Southwest _{0.9x} 0.77	x	2.19	х	62.67	ĺ	0.24	x	0.7	=	15.98	(79)
Southwest _{0.9x} 0.77	x	0.75	х	62.67	ĺ	0.24	×	0.7	=	5.47	(79)
Southwest _{0.9x} 0.77	x	2.19	х	85.75	ĺ	0.24	×	0.7	=	21.86	(79)
Southwest _{0.9x} 0.77	x	0.75	x	85.75	ĺ	0.24	_ x [0.7	=	7.49	(79)
Southwest _{0.9x} 0.77	x	2.19	х	106.25	ĺ	0.24	x	0.7	=	27.09	(79)
Southwest _{0.9x} 0.77	x	0.75	х	106.25	ĺ	0.24	×	0.7	=	9.28	(79)
Southwest _{0.9x} 0.77	x	2.19	x	119.01	j	0.24	x	0.7	_ =	30.34	(79)
Southwest _{0.9x} 0.77	x	0.75	x	119.01	ĺ	0.24	×	0.7	=	10.39	(79)
Southwest _{0.9x} 0.77	x	2.19	х	118.15	ĺ	0.24	_ x [0.7	=	30.12	(79)
Southwest _{0.9x} 0.77	x	0.75	x	118.15	ĺ	0.24	_ x [0.7	=	10.32	(79)
Southwest _{0.9x} 0.77	x	2.19	х	113.91	ĺ	0.24	×	0.7	=	29.04	(79)
Southwest _{0.9x} 0.77	x	0.75	х	113.91	ĺ	0.24	x	0.7	=	9.95	(79)
Southwest _{0.9x} 0.77	x	2.19	х	104.39	ĺ	0.24	x	0.7	=	26.62	(79)
Southwest _{0.9x} 0.77	x	0.75	х	104.39	ĺ	0.24	x	0.7	=	9.12	(79)
Southwest _{0.9x} 0.77	x	2.19	x	92.85	ĺ	0.24	×	0.7	=	23.67	(79)
Southwest _{0.9x} 0.77	x	0.75	x	92.85	ĺ	0.24	×	0.7	=	8.11	(79)
Southwest _{0.9x} 0.77	x	2.19	х	69.27	ĺ	0.24	x	0.7	=	17.66	(79)
Southwest _{0.9x} 0.77	x	0.75	x	69.27	j	0.24	_ x [0.7		6.05	(79)
Southwest _{0.9x} 0.77	x	2.19	x	44.07	i	0.24	- x [0.7	_ =	11.24	(79)
Southwest _{0.9x} 0.77	X	0.75	x	44.07	i	0.24	x	0.7	=	3.85	(79)
Southwest _{0.9x} 0.77	x	2.19	х	31.49	i	0.24		0.7		8.03	(79)
Southwest _{0.9x} 0.77	X	0.75	х	31.49	i	0.24		0.7	_	2.75	(79)
	لہ مد		l 		(02)		<u> </u>				
Solar gains in watts, calcula (83)m= 31.38 59.69 98.2		149.51 192.8	$\overline{}$	02.57 190.66	156	n = Sum(74)m65 115.73	70.44	38.72	26.12		(83)
Total gains – internal and se						1			I		. ,
(84)m= 510.44 535.42 557.		584.32 602.3	`	89.22 563.69	536	.28 509.46	489.22	485.41	493.73		(84)

7. Me	ean inter	nal temp	perature	(heating	season)								
Temp	erature	during h	neating p	eriods ir	n the livii	ng area	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilis	ation fac	tor for g	ains for	living are	ea, h1,m	(see Ta	ble 9a)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98	0.95	0.89	0.75	0.59	0.64	0.84	0.95	0.98	0.99		(86)
Mear	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.61	19.73	19.97	20.31	20.64	20.88	20.97	20.95	20.79	20.39	19.95	19.59		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilis	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.99	0.98	0.97	0.93	0.84	0.65	0.44	0.49	0.76	0.93	0.98	0.99		(89)
Mear	n interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)				
(90)m=	17.91	18.09	18.43	18.93	19.37	19.65	19.71	19.71	19.56	19.05	18.41	17.88		(90)
		-	-	-	-	-	-	-	1	fLA = Livin	g area ÷ (4) =	0.26	(91)
Mear	n interna	l temper	ature (fo	or the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	18.35	18.51	18.83	19.28	19.7	19.96	20.04	20.03	19.88	19.39	18.81	18.32		(92)
Apply	/ adjustn	nent to t	he mear	n interna	l temper	ature fro	m Table	4e, whe	ere appro	opriate	!			
(93)m=	18.35	18.51	18.83	19.28	19.7	19.96	20.04	20.03	19.88	19.39	18.81	18.32		(93)
8. Sp	ace hea	ting requ	uirement	t										
				•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u		l	T T	using Ta		l .					l			
L ICT:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm	1	I 0.04	0.07			0.77		0.07			(04)
(94)m=	0.98	0.97	0.96	0.92	0.84	0.67	0.48	0.52	0.77	0.92	0.97	0.98		(94)
		i	- `	4)m x (8		000.44	000.0	004.00	000.07	450.00	470.00	105.0		(OE)
(95)m=	500.55	521.82	535.56	538.76	503.56	393.11	269.6	281.23	392.67	452.22	470.63	485.3		(95)
	4.3	age exte	6.5	8.9	e from Ta	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
(96)m=		<u> </u>	ļ	Į	l .	<u> </u>	<u> </u>	<u> </u>	!	<u> </u>	7.1	4.2		(30)
	1157.97			845.56	erature, 650.25	432.45	276.94	292.05	467.37] 715	955.26	1155.84		(97)
					nonth, k\							1133.04		(01)
(98)m=	489.12	401.76	354.92	220.9	109.13	0	0.02	0	0	195.51	348.93	498.89		
(00)111=	100.12	101.10	00 1102		100.10			<u> </u>		(kWh/year			2619.15	(98)
Cnaa	a haatin	a roauir	omant in	. IdA/b/mi	2/voor			1010	ii pei yeai	(KVVII/yCai) = Odin(3	O)15,912 —		=
		• .		kWh/m²	year							l	47.1	(99)
		Ĭ	quiremer											
Calcu					See Tal				0	0.1	NI.			
Heet	Jan	Feb	Mar	Apr	May F°C into	Jun	Jul	Aug	Sep	Oct	Nov	Dec 10)		
(100)m=		e Lm (ca	liculated 0	using 2	0 Inter	757.83	596.59	611.66	ernai ten	nperatur 0	e from 1	able 10) 0		(100)
, ,	ation fac					131.83	590.59	011.00				U		(100)
(101)m=		0		0	0	0.72	0.81	0.77	0	0	0	0		(101)
(101)111-					<u>`</u>	L 0.72	L 0.01	L .,,						(10.)

Useful loss, hmLm (Watts) = (100)m x (101)m							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3 472.55	0	0	0	0		(102)
Gains (solar gains calculated for applicable weather region,	see Table	10)		l .			
(103)m= 0 0 0 0 623.42 595.8	8 562.73	0	0	0	0		(103)
Space cooling requirement for month, whole dwelling, continues to (104)m to zero if $(104)m < 3 \times (98)m$	nuous (kWi	h) = 0.0	24 x [(10	03)m – (102)m] x	c (41)m	
(104)m= 0 0 0 0 0 0 85.15	5 67.09	0	0	0	0		
	<u> </u>		l = Sum('	=	152.24	(104)
Cooled fraction Intermittency factor (Table 10b)		f C =	cooled	area ÷ (4	4) = [0.68	(105)
(106)m= 0 0 0 0 0.25 0.25	0.25	0	0	0	0		
		Tota	I = Sum((104)	=	0	(106)
Space cooling requirement for month = (104) m × (105) × (106)	' 		T -	T -	<u> </u>		
(107)m= 0 0 0 0 0 14.55	5 11.46	0 Total	0 I = Sum(107)	0	20.04	(107)
Space cooling requirement in kWh/m²/year			i = 3uiii() ÷ (4) =	I _{OM})	= [26.01	(107)
9b. Energy requirements – Community heating scheme		(107)) - (-) –		Ĺ	0.47	(100)
This part is used for space heating, space cooling or water he	eating provi	ided by	a comm	unity scl	neme		
Fraction of space heat from secondary/supplementary heating	g (Table 11) '0' if n	one	-		0	(301)
Fraction of space heat from community system $1 - (301) =$						1	(302)
The community scheme may obtain heat from several sources. The procedu			up to four	other heat	sources; th	ne latter	
includes boilers, heat pumps, geothermal and waste heat from power station Fraction of heat from Community CHP	is. See Appen	idix C.			ſ	0.13	(303a)
Fraction of community heat from heat source 2					Ī	0.87	(303b)
Fraction of total space heat from Community CHP			(3	02) x (303	sa) =	0.13	(304a)
Fraction of total space heat from community heat source 2			(3	02) x (303	(sb) =	0.87	(304b)
Factor for control and charging method (Table 4c(3)) for com-	munity heat	ting sys	tem		Ī	1	(305)
Distribution loss factor (Table 12c) for community heating sys	tem				Ī	1.05	(306)
Space heating					_	kWh/yea	<u></u>
Annual space heating requirement					Ĺ	2619.15	
Space heat from Community CHP		(98) x (30	04a) x (30	5) x (306)	=	357.51	(307a)
Space heat from heat source 2		(98) x (30	04b) x (30	5) x (306)	=	2392.6	(307b)
Efficiency of secondary/supplementary heating system in % (from Table	4a or A	ppendix	E)		0	(308
Space heating requirement from secondary/supplementary sy	ystem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating					-		_
Annual water heating requirement						1882.19	
If DHW from community scheme: Water heat from Community CHP		(64) x (30	03a) x (30	5) x (306)	= [256.92	(310a)
Water heat from heat source 2		(64) x (30	03b) x (30	5) x (306)	= [1719.38	(310b)
Electricity used for heat distribution	0.01	× [(307a)	(307e) +	· (310a)	(310e)] =	47.26	(313)
Cooling System Energy Efficiency Ratio					Ī	4.73	(314)
					_		=

Space cooling (if there is a fixed co	ooling system, if not enter 0)	= (107) ÷ (314) =	5.5 (315)
Electricity for pumps and fans within mechanical ventilation - balanced, or		ide	92.61 (330a)
warm air heating system fans			0 (330b)
pump for solar water heating			0 (330g)
Total electricity for the above, kWh	/year	=(330a) + (330b) + (330g) =	92.61 (331)
Energy for lighting (calculated in Ap	opendix L)		254.67 (332)
10b. Fuel costs – Community hear	ting scheme		
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating from CHP	(307a) x	2.97 x 0.01 =	10.62 (340a)
Space heating from heat source 2	(307b) x	4.24 x 0.01 =	101.45 (340b)
Water heating from CHP	(310a) x	2.97 x 0.01 =	7.63 (342a)
Water heating from heat source 2	(310b) x	4.24 x 0.01 =	72.9 (342b)
		Fuel Price	
Space cooling (community cooling	•	13.19 × 0.01 =	0.73 (348)
Pumps and fans	(331)	13.19 × 0.01 =	12.21 (349)
Energy for lighting	(332)	13.19 × 0.01 =	33.59 (350)
Additional standing charges (Table	12)		120 (351)
Total energy cost	= (340a)(342e) + (345)(354) =	:	359.13 (355)
11b. SAP rating - Community hear	ting scheme		
Energy cost deflator (Table 12)			0.42 (356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$		1.5 (357)
SAP rating (section12)			79.09 (358)
12b. CO2 Emissions – Community	heating scheme		(00.1)
Electrical efficiency of CHP unit			30.6 (361)
Heat efficiency of CHP unit	•	Energy Emission factor	63 (362)
		Energy Emission factor kWh/year kg CO2/kWh	kg CO2/year
Space heating from CHP)	(307a) × 100 ÷ (362) =	567.48 × 0.22	122.58 (363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	173.65 X 0.52	-90.12 (364)
Water heated by CHP	(310a) × 100 ÷ (362) =	407.81 X 0.22	88.09 (365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	124.79 × 0.52	-64.77 (366)
Efficiency of heat source 2 (%)	If there is CHP using two f	fuels repeat (363) to (366) for the second fue	96.7 (367b)
CO2 associated with heat source 2	! [(307b)+(310b))] x 100 ÷ (367b) x 0.22	918.5 (368)
Electrical energy for heat distribution	on [(313)	x 0.52	= 24.53 (372)

Total CO2 associated with commu	nity systems	(363)(366) + (368)(372	2)	=	998.8	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from im	nmersion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		•	998.8	(376)
CO2 associated with space cooling	9	(315) x	0.52	=	2.86	(377)
CO2 associated with electricity for	pumps and fans within dwe	elling (331)) x	0.52	=	48.06	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	=	132.18	(379)
Total CO2, kg/year	sum of (376)(382) =				1181.9	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =				21.25	(384)
El rating (section 14)					84.26	(385)
13b. Primary Energy – Community						
Electrical efficiency of CHP unit				L	30.6	(361)
Heat efficiency of CHP unit					63	(362)
		Energy kWh/year	Primary factor		Energy Wh/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	567.48 X	1.22		692.33	(363)
less credit emissions for electricity	(2076) (264) (262)			ı		7(00.4)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	173.65 ^X	3.07		-533.11	(364)
Water heated by CHP	$-(307a) \times (361) \div (362) =$ (310a) × 100 ÷ (362) =	173.65 X 407.81 X	1.22		-533.11 497.53	(364)
•	(310a) × 100 ÷ (362) =	170.00				⊒ ` ` ` ¬
Water heated by CHP	$(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	407.81 ×	1.22	nd fuel	497.53	(365)
Water heated by CHP less credit emissions for electricity	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us	407.81 × 124.79 ×	1.22	nd fuel =	497.53	(365)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us e 2 [(307b)	407.81 X 124.79 X ing two fuels repeat (363) to	1.22 3.07 (366) for the secon	1	497.53 -383.1 96.7	(365) (366) (367b)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us e 2 [(307b)	407.81 × 124.79 × ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x	1.22 3.07 (366) for the secon	=	497.53 -383.1 96.7 5187.82	(365) (366) (367b) (368)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372	1.22 3.07 (366) for the secon 1.22	=	497.53 -383.1 96.7 5187.82 145.1	(365) (366) (367b) (368) (372)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with comme	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise)	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372	1.22 3.07 (366) for the secon 1.22	=	497.53 -383.1 96.7 5187.82 145.1 5606.56	(365) (366) (367b) (368) (372) (373)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with committee if it is negative set (373) to zero	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise) ting (secondary)	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 , see C7 in Appendix C (309) x	1.22 3.07 (366) for the secon 1.22	= = =	497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(365) (366) (367b) (368) (372) (373) (373)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commits if it is negative set (373) to zero in the second se	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise) ting (secondary) immersion heater or instar	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 , see C7 in Appendix C (309) x	1.22 3.07 (366) for the second 1.22	= = =	497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(365) (366) (367b) (368) (372) (373) (373) (374)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commit if it is negative set (373) to zero in the Energy associated with space head Energy associated with water from	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise) ting (secondary) I immersion heater or instarte and water heating	407.81 × 124.79 × ing two fuels repeat (363) to)+(310b)] × 100 ÷ (367b) × [(313) × (363)(366) + (368)(372) , see C7 in Appendix C (309) × staneous heater(312) ×	1.22 3.07 (366) for the second 1.22	= = =	497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(365) (366) (367b) (368) (372) (373) (373) (374) (375)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with commit if it is negative set (373) to zero Energy associated with space head Energy associated with water from Total Energy associated with space	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise) ting (secondary) immersion heater or instance and water heating	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372) , see C7 in Appendix C (309) x ataneous heater(312) x (373) + (374) + (375) = (315) x	1.22 3.07 (366) for the second 1.22 2)) 0 1.22	= = = = =	497.53 -383.1 96.7 5187.82 145.1 5606.56 0 0 5606.56	(365) (366) (367b) (368) (372) (373) (373) (374) (375) (376)
Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) Energy associated with heat source Electrical energy for heat distribution Total Energy associated with command if it is negative set (373) to zero Energy associated with space head Energy associated with water from Total Energy associated with space Energy associated with space cool	(310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use e 2 [(307b) on munity systems (unless specified otherwise) ting (secondary) immersion heater or instance and water heating ling for pumps and fans within desired	407.81 x 124.79 x ing two fuels repeat (363) to)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372) , see C7 in Appendix C (309) x ataneous heater(312) x (373) + (374) + (375) = (315) x	1.22 3.07 (366) for the second 1.22 2)) 0 1.22	= = = = =	497.53 -383.1 96.7 5187.82 145.1 5606.56 0 0 5606.56 16.9	(365) (366) (367b) (368) (372) (373) (373) (374) (375) (376) (377)

			User D	etails:						
Assessor Name:	Chris Hocknell			Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2	2012		Softwa	are Vei	sion:		Versio	n: 1.0.4.10	
		Р	roperty.	Address	: Flat 0-1	l-Green				
Address :										
Overall dwelling diment	nsions:		۸ro	a(m²)		Av Ho	ight(m)		Volume(m³)	
Basement					(1a) x		3.1	(2a) =	134.07	(3a)
Ground floor			6	3.89	(1b) x	2	2.6	(2b) =	166.11	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+	(1e)+(1r	1) 1	07.14	(4)			.		
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:										
<u> </u>	main heating	secondar heating	У	other		total			m³ per hour	
Number of chimneys	0 +	0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	Ī + Ē	0	Ī = [0	x	20 =	0	(6b)
Number of intermittent far	ns					0	x ′	10 =	0	(7a)
Number of passive vents					Ī	0	x '	10 =	0	(7b)
Number of flueless gas fir	es					0	X 4	40 =	0	(7c)
								A * I		
		(0.) (0.) (-		_ 、	_			i	anges per hou	_
Infiltration due to chimney If a pressurisation test has be					continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in th		, , , , , , , , , , , , , , , , , , ,	(/),			(-/ (/		0	(9)
Additional infiltration	2 , ,						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timb	er frame or	0.35 fo	r masoni	ry constr	uction			0	(11)
if both types of wall are pro	•	rresponding to	the great	er wall are	a (after			'		_
deducting areas of opening If suspended wooden fl		ealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	,	,	`	,,					0	(13)
Percentage of windows	and doors draugh	t stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value, o	q50, expressed in	cubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabili	ty value, then (18) =	= [(17) ÷ 20]+(8	3), otherw	ise (18) = ((16)				0.15	(18)
Air permeability value applies	s if a pressurisation test	has been dor	ne or a deg	gree air pe	rmeability	is being u	sed	'		
Number of sides sheltered	d								2	(19)
Shelter factor				(20) = 1 -	`	9)] =			0.85	(20)
Infiltration rate incorporati				(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified fo		1							1	
	Mar Apr Ma	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	1			•	ı	ı	•	<u> </u>	ı	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A.P. stadis Classica and	- /-!!- '	(-11			(04 -)	(00-)	•			l	
Adjusted infiltration rat	e (allowi	ng for sr 0.14	0.14	a wina s	o.12	0.12	(22a)m 0.13	0.14	0.14	0.15		
Calculate effective air		1			I	0.12	0.13	0.14	0.14	0.15		
If mechanical ventila	ation:										0.5	(23a)
If exhaust air heat pump								o) = (23a)			0.5	(23b)
If balanced with heat reco	•	•	•		,	,	,				76.5	(23c)
a) If balanced mech					- ` ` 	- ^ ` 	ŕ	 		``	÷ 100]	(24a)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mecha	anicai ve	entilation 0	without	neat rec	overy (r	VIV) (246 1 0	0 m = (2)	$\frac{26}{1}$ $\frac{1}{0}$	23b) 0	0		(24b)
c) If whole house ex								0	0	U		(240)
if (22b)m < 0.5 ×			•	-				.5 × (23b)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation	on or wh	ole hous	e positiv	e input	ventilatio	on from I	oft				l	
if (22b)m = 1, th	en (24d)	m = (22l	o)m othe	rwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]			ı	
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change	1	<u> </u>	<u> </u>	``	ŕ		` ´ ´ 				l	(05)
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and he	eat loss p	paramete	er:									
3. Heat losses and he ELEMENT Gros	SS	oaramete Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/F	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gros	SS	Openin	gs			W/m2			<) 			
ELEMENT Gros	SS	Openin	gs	A ,r	m² x	W/m2	=	(W/I	<) 			kJ/K
ELEMENT Gros area Doors	SS	Openin	gs	A ,r	m ² x 2 x ¹	W/m2	eK = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gros area Doors Windows Type 1	SS	Openin	gs	A ,r 2.6	m ² x 2 x ¹ x ¹	W/m2 1.2 /[1/(1.2)+	0.04] = 0.04] =	(W/F 3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2	SS	Openin	gs	A ,r 2.6 13.52 2.73	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/H 3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	SS	Openin	gs	A ,r 2.6 13.52 2.73 4.16 7.54 3.51	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02	<)			kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	ss (m²)	Openin	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575	()			kJ/K (26) (27) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509	\() \(kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	ss (m²)	Openin m	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = 0.	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2	ss (m²)	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04]	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 Walls Type3 43.	32 32 4 22	34.00 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type4	32 32 38 4 22	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.2	32 (m²) 38 4 22 7	34.00 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 20.6 Walls Type3 43. Walls Type4 Walls Type4 Cancer 11.4	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.4 Roof Type2 4.8	32 38 4 22 7	34.00 0 0 0	gs ²	A ,r 2.6 13.52 2.73 4.16 7.54 3.51 43.25 20.68 43.4 28.22 6.27 11.42 4.83	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

ъ.											_			–
Party o	_					59.06			/F/4/11	\ 0.04	. L			(32b)
				effective wi nternal wal			ated using	i formula 1,	/[(1/U-valu	e)+0.04] a	as given in	paragraph	3.2	
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.12	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	.(32e) =	34247.85	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value	: Medium	[250	(35)
	_		ere the de tailed calc		constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	ible 1f		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<					ſ	36.66	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)						L		
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea	at loss ca	alculated	monthly	У				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		_
Heat Id	ss para	meter (H	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	.12 /12=	133.24	(39)
(40)m=	1.26	1.26	1.26	1.24	1.24	1.23	1.23	1.22	1.23	1.24	1.25	1.25		
				•						Average =	Sum(40) ₁ .	.12 /12=	1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)	I	I		ı			i			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
				<u> </u>			01		30	0.		31		
				l			01	01	30	<u> </u>	00			
4. Wa	iter heat	ing ener	rgy requi	irement:			01	01	30		00	kWh/ye	ar:	
Assum if TF	ed occu A > 13.9	ipancy, I 9, N = 1	N		(-0.0003)2)] + 0.0			2		ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ipancy, I 9, N = 1 9, N = 1	N + 1.76 x	[1 - exp		349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻		9)	kWh/ye	ar:	, ,
Assum if TF if TF Annua	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	: [1 - exp ge in litre	es per da	349 x (TF	FA -13.9 erage =		0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ar:	(42)
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre	es per da 5% if the o	349 x (TF ay Vd,av	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36	ΓFA -13.	9)	kWh/ye	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld) Jul)2)] + 0.0 (25 x N) to achieve	0013 x (⁻ + 36 a water us Sep	ΓFA -13. se target o Oct 102.63	9) 100 Nov	kWh/ye 8 0.62 Dec 110.68	ar:	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	ΓFA -13. se target o Oct 102.63 Total = Su	9) 100 Nov 106.65 m(44)112 =	kWh/ye 8 0.62 Dec 110.68	ear: 1207.41	, ,
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	Ipancy, I 9, N = 1 9, N = 1 e hot wanted average litres per properties of the second seco	+ 1.76 x ater usage hot water person per Mar day for ear 102.63	ge in litre usage by r day (all w Apr ach month 98.61	es per da 5% if the a vater use, I May $Vd,m = fa$ 94.58	349 x (TF ay Vd,ave livelling is that and co. Jun ctor from 7 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye 8 0.62 Dec 110.68 c, 1d)		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us 98.61 - 9 kWh/mor 115.06	Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 158.96	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 110.68	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 102.63 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = far$ 94.58 $onthly = 4$.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61 98.61 115.06	Oct 102.63 Fotal = Su th (see Ta 134.1	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68 158.96		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 110.68 content of 164.13	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 102.63 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = far$ 94.58 $onthly = 4$.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61 98.61 115.06	Oct 102.63 Fotal = Su th (see Ta 134.1	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 158.96	1207.41	(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan er usage in 110.68 content of 164.13 taneous w 24.62 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water 143.55 vater heatin 21.53 IOSS:	H + 1.76 x Atter usage hot water person per Mar day for ear 102.63 148.13 Ing at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (no. 19.37	es per da 5% if the a vater use, I May Vd,m = fa 94.58	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93	erage = designed to did) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86	(25 x N) to achieve Aug (43) 94.58 07m / 3600 113.71 boxes (46)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 102.63 used - cal 148.13 ang at point 22.22	ge in litre usage by a day (all was Apr ach month 98.61 129.15 of use (no. 19.37	es per da 5% if the orater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instant (46)m= Water Storag If comm	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volumer	pancy, I P, N = 1 e hot wa al average litres per p Feb n litres per 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres) eating a	H + 1.76 x ater usage hot water person per Mar 102.63 used - cal 148.13 ang at point 22.22 including and no tal 148.13	ge in litre usage by r day (all w Apr ach month 98.61 129.15 f of use (not 19.37 and any so	es per da 5% if the of 5% if th	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26 90.013 x (7.26)	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum munity h vise if no	Ipancy, I P, N = 1 e hot was al average litres per p Feb 106.65 hot water 143.55 vater heatin 21.53 loss: e (litres) eating all p stored loss:	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - cal 148.13 ang at point 22.22 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by a day (all was Apr ach month 98.61 129.15 for use (not appear) and any sound in dwer (this in the contact of the contact and any sound in dwer (this in the contact and any sound in dwer (this in the contact and any sound in dwer (this in the contact and any sound in the contact and an	es per da 5% if the o rater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e ocludes i	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed of ld) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 90.013 x (7.26)	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46) (47)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water a) If m	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 110.68 content of 164.13 taneous w 24.62 storage e volum munity he vise if no storage tanufact	pancy, I Po, N = 1 Po, N = 1 Po hot was Po litres per p 106.65 Potential water 143.55 Potential water 21.53 Toss: e (litres) eating as o stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar reay for ear 102.63 used - cal 148.13 ang at point 22.22 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by a day (all was Apr ach month 98.61 129.15 for use (not apr any sound in dwarf and sound in dwarf (this in oss factor)	es per da 5% if the o rater use, I May Vd,m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e ocludes i	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed of ld) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26 90.013 x (7.26)	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96 47)	kWh/ye 8 0.62 Dec 110.68 c, 1d) 158.96 23.84	1207.41	(43) (44) (45) (46)

Energy lost from water storage, k	•			(48) x (49)	=		1	10		(50)
b) If manufacturer's declared cyl									· [(54)
Hot water storage loss factor from If community heating see section	•	milie/ua	у)				0.	02		(51)
Volume factor from Table 2a							1.	03		(52)
Temperature factor from Table 2b	b						0	.6		(53)
Energy lost from water storage, k	⟨Wh/year			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter (50) or (54) in (55)							1.	03		(55)
Water storage loss calculated for	r each month			((56)m = (55) × (41)r	n				
` '	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated solar storag	- · · · · · ·	x [(50) – (l	H11)] ÷ (50	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01 28.92 32.01 3	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) from	ո Table 3							0		(58)
Primary circuit loss calculated for	,	, ,	,	` '						
(modified by factor from Table				_						(50)
(59)m= 23.26 21.01 23.26 2	22.51 23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for each m	nonth (61)m = (60) ÷ 36	65 × (41)	m					1	
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water hear	ting calculated	for each	n month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	1
(62)m= 219.41 193.48 203.41 1	182.64 179.2	160.43	154.37	168.98	168.56	189.37	199.87	214.23		(62)
Solar DHW input calculated using Append	dix G or Appendix I	H (negativ	e quantity	v) (enter '0	if no sola	r contributi	on to wate	er heating)		
(add additional lines if FGHRS ar	nd/or WWHRS	applies,	see Ap	pendix (3)					
(63)m= 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
(64)m= 219.41 193.48 203.41 1	182.64 179.2	160.43	154.37	168.98	168.56	189.37	199.87	214.23		_
				·	out from wa				2233.94	(64)
Heat gains from water heating, k	1 1	(0.85		+ (61)m		(46)m	+ (57)m	+ (59)m]	
(65)m= 98.8 87.67 93.48 8	85.74 85.42	78.35	77.17	82.03	81.05	88.81	91.47	97.07		(65)
include (57)m in calculation of	(65)m only if cy	/linder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (see Table 5 a	ınd 5a):									
Metabolic gains (Table 5), Watts										
Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 167.79 167.79 167.79 1	167.79 167.79	167.79	167.79	167.79	167.79	167.79	167.79	167.79		(66)
Lighting gains (calculated in Appe	endix L, equation	on L9 or	· L9a), a	lso see	Table 5					
(67)m= 59.59 52.93 43.05 3	32.59 24.36	20.57	22.22	28.89	38.77	49.23	57.46	61.25		(67)
Appliances gains (calculated in A	Appendix L, equ	ation L1	13 or L1	3a), alsc	see Tal	ole 5				
(68)m= 399.08 403.22 392.78 3	370.57 342.52	316.16	298.56	294.41	304.85	327.07	355.11	381.47		(68)
Cooking gains (calculated in App	endix L, equati	on L15	or L15a)	, also se	e Table	5				
(69)m= 54.58 54.58 54.58 \$	54.58 54.58	54.58	54.58	54.58	54.58	54.58	54.58	54.58		(69)
Pumps and fans gains (Table 5a))									
(70)m= 0 0 0	0 0	0	0	0	0	0	0	0		(70)
Losses e.g. evaporation (negative	e values) (Tabl	e 5)								
(71)m= -111.86 -111.86 -111.86 -1	111.86 -111.86	-111.86	-111.86	-111.86	-111.86	-111.86	-111.86	-111.86		(71)
		· · · · ·		<u>-</u>	<u></u>	<u></u>	·			

Water	heating	g gains (T	able 5)													
(72)m=	132.79	` `	125.64	119.08	114.82	10	08.82	103.72	110	.25 1	12.57	119.3	7 127.03	130.48	1	(72)
Total i	nterna	I gains =			ļ		(66)	m + (67)m	ı + (68	3)m + (6	<u>-</u> 69)m + (1	70)m +	(71)m + (72)	m	J	
(73)m=	701.97		671.97	632.74	592.21	5	56.06	535.01	544	.06	566.7	606.17	7 650.11	683.7	1	(73)
6. Sol	ar gain	is:														
			using sola	r flux from	Table 6a	and	assoc	iated equa	tions	to conv	ert to the	e applic	able orientat	ion.		
Orienta		Access F	actor	Area			Flu			g			FF		Gains	
		Table 6d		m²			Tal	ole 6a		Tab	ole 6b		Table 6c		(W)	
Northea	ast _{0.9x}	0.54	X	13.	52	X	1	1.28	x	С).24	x	0.7	=	12.46	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	1	1.28	x	C).24	X	0.7	=	3.59	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	1	1.28	X	C).24	×	0.7	=	5.46	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	2	2.97	X	C).24	×	0.7	=	25.35	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	2	2.97	X	C).24	x	0.7	=	7.3	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	2	2.97	x	C).24	×	0.7	=	11.12	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	4	1.38	x	C).24	×	0.7		45.68	(75)
Northea	ast _{0.9x}	0.77	x	2.7	73	X	4	1.38	x	C).24	×	0.7	=	13.15	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	4	1.38	x	C).24	×	0.7	_ =	20.04	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	6	7.96	x	C).24	×	0.7		75.02	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	6	7.96	x	C).24	×	0.7	=	21.6	(75)
Northea	ast _{0.9x}	0.77	x	4.1	6	X	6	7.96	x	C).24	X	0.7		32.91	(75)
Northea	ast _{0.9x}	0.54	x	13.	52	X	9	1.35	x	О).24	×	0.7	╗-	100.84	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	9	1.35	X	C).24	×	0.7	-	29.03	(75)
Northea	ast _{0.9x}	0.77	x	4.1	6	X	9	1.35	x	C).24	X	0.7		44.24	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	9	7.38	X	C).24	x	0.7	<u> </u>	107.5	(75)
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	9	7.38	x	C).24	×	0.7	=	30.95	(75)
Northea	ast _{0.9x}	0.77	x	4.1	6	X	9	7.38	x	C).24	X	0.7	<u> </u>	47.17	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	,	91.1	X	C).24	×	0.7	<u> </u>	100.56	(75)
Northea	ast _{0.9x}	0.77	X	2.7	73	X	,	91.1	x	C).24	X	0.7	=	28.96	(75)
Northea	ast _{0.9x}	0.77	X	4.1	6	X	,	91.1	X	C).24	X	0.7	<u> </u>	44.12	(75)
Northea	ast _{0.9x}	0.54	X	13.	52	X	7	2.63	X	C).24	×	0.7	-	80.17	(75)
Northea	ast 0.9x	0.77	X	2.7	' 3	X	7	2.63	x	О).24	×	0.7	一 -	23.08	(75)
Northea	ast 0.9x	0.77	х	4.1	6	X	7	2.63	x	C).24	×	0.7	=	35.17	(75)
Northea	ast 0.9x	0.54	Х	13.	52	X	5	0.42	x	C).24	×	0.7	=	55.66	(75)
Northea	ast 0.9x	0.77	X	2.7	73	X	5	0.42	x	C).24	×	0.7	=	16.03	(75)
Northea	ast 0.9x	0.77	х	4.1	6	X	5	0.42	x	C).24	×	0.7	=	24.42	(75)
Northea	ast _{0.9x}	0.54	х	13.	52	X	2	8.07	x	C).24	×	0.7		30.98	(75)
Northea	ast _{0.9x}	0.77	x	2.7	' 3	X	2	8.07	x	0).24	×	0.7		8.92	(75)
Northea	ast _{0.9x}	0.77	x	4.1	6	X	2	8.07	x	0).24	×	0.7		13.59	(75)
Northea	ast _{0.9x}	0.54	x	13.	52	X		14.2	x	0).24	×	0.7		15.67	(75)
Northea	ast _{0.9x}	0.77	х			x		14.2	x	0).24	x	0.7	=	4.51	(75)

Northeast 0.9					Г			1			-		_			7(75)
Northeast 0.9		X	4.1		X [14.2] X]		0.24	X	0.7	_	=	6.88	(75)
Northeast 0.9		X	13.	_	X		9.21	X).24	X	0.7	_	=	10.17	(75)
		X	2.7		X		9.21] X]).24	X	0.7	_	=	2.93	(75)
Northeast 0.9	• • • • • • • • • • • • • • • • • • • •	×	4.1	=	X		9.21	X).24	_ ×	0.7	_	=	4.46	(75)
Southeast 0.9	• • • • • • • • • • • • • • • • • • • •	х	3.5	1	X	3	6.79	X).24	X	0.7	_	=	15.04	(77)
Southeast 0.9		×	3.5	1	x L	6	2.67	X	C).24	X	0.7	_	=	25.61	(77)
Southeast 0.9	• • • • • • • • • • • • • • • • • • • •	X	3.5	1	X	8	5.75	X).24	X	0.7		=	35.04	(77)
Southeast 0.9		×	3.5	1	x	1	06.25	X	C).24	X	0.7		=	43.42	(77)
Southeast 0.9	0.77	×	3.5	1	x	1	19.01	X).24	X	0.7		=	48.63	(77)
Southeast 0.9	0.77	X	3.5	1	X	1	18.15	X	C).24	X	0.7		=	48.28	(77)
Southeast 0.9	0.77	x	3.5	1	x	1	13.91	X	C).24	X	0.7		=	46.55	(77)
Southeast 0.9	0.77	X	3.5	1	x	1	04.39	X	C).24	X	0.7		=	42.66	(77)
Southeast 0.9	0.77	x	3.5	1	x [9	2.85	x	C).24	X	0.7		=	37.94	(77)
Southeast 0.9	0.77	X	3.5	1	x	6	9.27	x	C).24	×	0.7		=	28.31	(77)
Southeast 0.9	0.77	х	3.5	1	x	4	4.07	X	C).24	x	0.7		=	18.01	(77)
Southeast 0.9	0.77	х	3.5	1	x	3	1.49	x	C).24	×	0.7		=	12.87	(77)
Southwest _{0.9}	0.77	x	7.5	4	x	3	6.79	1	C).24	x	0.7		=	32.3	(79)
Southwest _{0.9}	0.77	×	7.5	4	x	6	2.67	1	C).24	x	0.7		=	55.02	(79)
Southwest _{0.9}	0.77	x	7.5	4	x [8	5.75	Ī	C).24	x	0.7		=	75.28	(79)
Southwest _{0.9}	0.77	x	7.5	4	x	1	06.25	Ī	C).24	×	0.7		=	93.27	(79)
Southwest _{0.9}	0.77	x	7.5	4	x	1	19.01	Ī	C).24	×	0.7		=	104.47	(79)
Southwest _{0.9}	0.77	х	7.5	4	x [1	18.15	j	C).24	×	0.7		=	103.72	(79)
Southwest _{0.9}	0.77	Х	7.5	4	x [1	13.91	j	C).24	×	0.7		=	99.99	(79)
Southwest _{0.9}	0.77	x	7.5	4	x [1	04.39	j	C).24	×	0.7		=	91.64	(79)
Southwest _{0.9}	0.77	×	7.5	4	x [9	2.85	j	C).24	×	0.7		=	81.51	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [6	9.27	j	C).24	×	0.7	一	=	60.81	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [4	4.07	ĺ	C).24	×	0.7	一	=	38.69	(79)
Southwest _{0.9}	x 0.77	X	7.5	4	x [3	1.49	j	C).24	×	0.7	一	=	27.64	(79)
					_			_								
Solar gains	in watts, ca	alculated	for each	n month	1			(83)m	n = Sum	n(74)m .	(82)m					
(83)m= 68.8	4 124.4	189.19	266.22	327.21	33	7.62	320.19	272	.73 2	215.56	142.6	1 83.76	58.0)7		(83)
Total gains	– internal a	and solar	(84)m =	(73)m	+ (8	3)m	, watts									
(84)m= 770.	821.52	861.16	898.96	919.42	89	3.67	855.19	816	.79 7	782.26	748.7	7 733.86	741.	77		(84)
7. Mean in	ternal temp	perature	(heating	seasor	n)											
	re during h					rea t	from Tal	ble 9	, Th1	(°C)					21	(85)
Utilisation	factor for g	ains for I	iving are	a, h1,m	n (se	e Ta	ble 9a)									
Ja	n Feb	Mar	Apr	May	Ť	lun	Jul	А	ug	Sep	Oc	Nov	De	ЭС		
(86)m= 1	0.99	0.99	0.97	0.92	C	.8	0.64	0.6	68	0.88	0.97	0.99	1			(86)
Mean inter	nal temper	ature in	living are	ea T1 (f	ollov	v ste	ns 3 to 7	7 in T	able 9	9c) 		•			l	
(87)m= 19.7		20.05	20.36	20.67	_	0.89	20.97	20.		20.81	20.44	20.03	19.	7		(87)
` ′					<u> </u>		!					<u> </u>			I	
Temperatu (88)m= 19.8		19.87	19.88	19.89	1	9.9	19.9	19		19.89	19.89	19.88	19.8	38		(88)
(55)=	1 .0.01	1	.0.00	. 5.00			1					1 .0.00	1			\ - <i>/</i>

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	h2.m (se	ee Table	9a)						
(89)m=	0.99	0.99	0.98	0.96	0.89	0.71	0.5	0.55	0.82	0.96	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)			ı	
(90)m=	18.18	18.35	18.67	19.12	19.54	19.82	19.89	19.88	19.73	19.24	18.64	18.16		(90)
									1	fLA = Livin	g area ÷ (4	1) =	0.15	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwel	ling) = f	LA × T1	+ (1 – fL	.A) × T2					_
(92)m=	18.4	18.57	18.87	19.31	19.71	19.98	20.05	20.04	19.89	19.41	18.85	18.38		(92)
Apply	adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate			ı	
(93)m=	18.4	18.57	18.87	19.31	19.71	19.98	20.05	20.04	19.89	19.41	18.85	18.38		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	nt Ti,m=(76)m an	d re-calc	culate	
uio ai	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>										
(94)m=	0.99	0.99	0.98	0.95	0.88	0.72	0.52	0.57	0.82	0.95	0.98	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m				ı				ı	
(95)m=	764.09	811.05	841.82	854.42	809.22	641.82	442.49	461.6	639.01	713.58	722.85	736.33		(95)
Montl	nly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
							=[(39)m	x [(93)m	– (96)m]			•	
		l	1668.75	l			453.01	477.53	764.89	1171.98	1569.68	1904		(97)
-				i				 		5)m] x (4 ²	· -		Ī	
(98)m=	853.66	696.67	615.23	383.65	190.24	0	0	0	0	341.05	609.72	868.75		٦
								Tota	ıl per year	(kWh/year) = Sum(9	8) _{15,912} =	4558.96	<u> </u> (98)
Space	e heatin	g require	ement in	kWh/m²	² /year								42.55	(99)
9b. En	ergy red	quiremer	nts – Cor	mmunity	heating	scheme)							
•		-		• .		-		• .	-	a comm	unity sch	neme.		7,000
	•			•	• •	•	heating (Table 1	1) 'U' If N	one			0	(301)
Fraction	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-									up to four (other heat	sources; t	he latter	
			s, geotnerr Commun		aste neat f	rom powe	r stations.	See Appe	naix C.				0.13	(303a)
			heat fro	•	source 2								0.87](303b)
		•	heat fro			HP				(30	02) x (303	a) =	0.13] (304a)
		•	heat fro		•		e 2			(30	02) x (303	b) =	0.87] (304b)
Factor	for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for (commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	a											kWh/year	_
-		-	requirem	nent									4558.96	7
Space	heat fro	m Comr	munity C	:HP					(98) x (30	04a) x (305	5) x (306) :	=	622.3	」 │(307a)
27400		55.711		- ••					(==) == (0	, - (0	, ()			J (= = -)

		(99) (994) (995) (999)	Г	7,0071)
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	4164.61	(307b)
Efficiency of secondary/supplementary	,	,	0	(308
Space heating requirement from secon	idary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2233.94	٦
If DHW from community scheme:			2200.01	
Water heat from Community CHP		(64) x (303a) x (305) x (306) =	304.93	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	2040.71	(310b)
Electricity used for heat distribution	0.0	11 × [(307a)(307e) + (310a)(310e)] =	71.33	(313)
Cooling System Energy Efficiency Rati	0		0	(314)
Space cooling (if there is a fixed coolin	g system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dumechanical ventilation - balanced, extra	· ,	Э	247.21	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/yea	ır	=(330a) + (330b) + (330g) =	247.21	(331)
Energy for lighting (calculated in Apper	ndix L)		420.97	(332)
Electricity generated by PVs (Appendix	(M) (negative quantity)		-228.98	(333)
Electricity generated by wind turbine (A	Appendix M) (negative quantity)		0	(334)
10b. Fuel costs – Community heating	scheme			
10b. Fuel costs – Community heating	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating Space heating from CHP	Fuel			(340a)
	Fuel kWh/year	(Table 12)	£/year	(340a) (340b)
Space heating from CHP	Fuel kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	£/year 18.48	_
Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	(Table 12) 2.97 4.24 x 0.01 =	£/year 18.48 176.58	(340b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.97 2.97 2.97 2.001 = 4.24 x 0.01 = 4.24	£/year 18.48 176.58 9.06	(340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	£/year 18.48 176.58 9.06	(340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	(Table 12) 2.97	£/year 18.48 176.58 9.06 86.53	(340b) (342a) (342b) (342b) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = Fuel Price 13.19 x 0.01 =	£/year 18.48 176.58 9.06 86.53	(340b) (342a) (342b) (349)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = Fuel Price 13.19 x 0.01 =	£/year 18.48 176.58 9.06 86.53 32.61 55.53	(340b) (342a) (342b) (342b) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.001 = 4.24 2.97 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24	£/year 18.48 176.58 9.06 86.53 32.61 55.53 120	(340b) (342a) (342b) (342b) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.001 = 4.24 2.97 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24	£/year 18.48 176.58 9.06 86.53 32.61 55.53 120 -30.2	(340b) (342a) (342b) (342b) (349) (350) (351) (352)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.001 = 4.24 2.97 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24	£/year 18.48 176.58 9.06 86.53 32.61 55.53 120 -30.2	(340b) (342a) (342b) (342b) (349) (350) (351) (352)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost 11b. SAP rating - Community heating	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) = (340a)(342e) + (345)(354) =	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.001 = 4.24 2.97 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24	£/year 18.48 176.58 9.06 86.53 32.61 55.53 120 -30.2 468.58	(340b) (342a) (342b) (349) (350) (351) (352) (355)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost 11b. SAP rating - Community heating Energy cost deflator (Table 12)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (310b) x (331) (332) = (340a)(342e) + (345)(354) = scheme	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.97 2.001 = 4.24 2.97 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24 2.001 = 4.24	£/year 18.48 176.58 9.06 86.53 32.61 55.53 120 -30.2 468.58	(340b) (342a) (342b) (342b) (349) (350) (351) (352) (355)

12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	r Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	987.78 ×	0.22	213.36	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	302.26 ×	0.52	-156.87	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	484.02 ×	0.22	104.55	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	148.11 ×	0.52	-76.87	(366)
Efficiency of heat source 2 (%)	If there is CHP u	using two fuels repeat (363) to	o (366) for the second fu	96.7	(367b)
CO2 associated with heat source 2	[(307	(b)+(310b)] x 100 ÷ (367b) x	0.22	1386.09	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	37.02	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	"2)	= 1507.27	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instanta	aneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		1507.27	(376)
CO2 associated with electricity for	pumps and fans within dw	relling (331)) x	0.52	= 128.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 218.48	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as app	licable	0.52 x 0.01 =	-118.84	(380)
Total CO2, kg/year	sum of (376)(382) =			1735.22	(383)
Dwelling CO2 Emission Rat	te (383) ÷ (4) =			16.2	(384)
El rating (section 14)				84.72	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	987.78 ×	1.22	1205.09	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	302.26 ×	3.07	-927.94	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	484.02 X	1.22	590.51	(365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	148.11 ×	3.07	-454.7	(366)
Efficiency of heat source 2 (%)	If there is CHP u	using two fuels repeat (363) to	(366) for the second fu	96.7	(367b)
Energy associated with heat source	e 2 [(307	(b)+(310b)] x 100 ÷ (367b) x	1.22	7828.84	(368)
Electrical energy for heat distribution	on	[(313) x		= 218.97	(372)
Total Energy associated with comm	nunity systems	(363)(366) + (368)(37	72)	= 8460.77	(373)
	name by otomo	(303)(300) + (300)(37	-)	0400.77	(/

Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or instan	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			8460.77	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans within o	lwelling (331)) >	3.07	=	758.92	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1292.39	(379)
Energy saving/generation technologies					_
Item 1		3.07 × 0.0)1 =	-702.96	(380)
Total Primary Energy, kWh/year sum of (376)	5)(382) =			9809.12	(383)

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 20	12		Strom Softwa					016363 n: 1.0.4.10	
		Pr	operty .	Address	: Flat 0-2	2-Green				
Address :										
Overall dwelling dime	ensions:		A = 0.	n/m 2\		Av. Ua	iaht/m\		Valuma/m³	`
Basement				a(m²) 3.37	(1a) x		ight(m) 3.1	(2a) =	Volume(m³	(3a)
Ground floor			6	6.91	(1b) x	2	2.6	(2b) =	173.97	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1	e)+(1n) 1	10.28	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:										
		econdary	y	other		total			m³ per hou	r
Number of chimneys	0 +	0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0] + [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns					0	X ·	10 =	0	(7a)
Number of passive vents	;					0	X '	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
								Air ob	anges per ho	
Infiltration due to chimne	vs. fluos and fans – (3a)±(6h)±(7:	2)+(7h)+(7c) –	Г					_
If a pressurisation test has b	•				continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber	frame or	0.35 fo	r masoni	ry constr	uction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corre	sponding to	the great	er wall are	a (after					
If suspended wooden	= :	iled) or 0.	1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of windows	s and doors draught s	tripped							0	(14)
Window infiltration				0.25 - [0.2	! x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cu	bic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(17) ÷ 20]+(8), otherwi	ise (18) = ((16)				0.15	(18)
Air permeability value applie	•	s been don	e or a deg	gree air pe	rmeability	is being u	sed	ı		_
Number of sides sheltere Shelter factor	ed			(20) = 1 -	[0 075 x (1	9)1 –			3	(19)
	ting chalter factor			(20) = 1 (21) = (18)	•	J)] –			0.78	(20)
Infiltration rate incorporate Infiltration rate modified f	_	Ч		(21) = (10	, ^ (ZU) =				0.12	(21)
Jan Feb	Mar Apr May	1 1	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 0011	- Jul	, , .ug	ı Cop	1 000	1 1101			
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
(/		1 5.5	3.5	L	<u> </u>	L	L	L		

Wind Factor (22a)m = (22)n	n ÷ 4									
(22a)m= 1.27 1.25 1.25		.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (all	uving for shalt	or and wind a		(21a) v ((22a)m	!		<u>. </u>	l	
Adjusted infiltration rate (allo		.12 0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air chang		l l	1	0.11	0.12	0.12	0.10	0.11		
If mechanical ventilation:									0.5	(23a)
If exhaust air heat pump using A) = (23a)			0.5	(23b)
If balanced with heat recovery:	•	•	,	·		Ola)	001-) [(00-)	76.5	(23c)
a) If balanced mechanica (24a)m= 0.27 0.26 0.20		n neat recov .24 0.23	ery (MV)	HR) (24a _{0.23}	m = (2) 0.23	2b)m + (2 0.24	23b) x [²	0.25	÷ 100] 	(24a)
b) If balanced mechanica	ļ	l	ļ	LI				0.23		(244)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 0		0	0	0	0	0	0		(24b)
c) If whole house extract				ا	utside					, ,
if $(22b)m < 0.5 \times (23b)$	•	-				.5 × (23b)			
(24c)m= 0 0 0	0	0 0	0	0	0	0	0	0		(24c)
d) If natural ventilation or										
if $(22b)m = 1$, then $(24b)m = 1$				- ``						(244)
(24d)m= 0 0 0	0	0 0	0	0	0 (05)	0	0	0		(24d)
Effective air change rate - (25)m= 0.27 0.26 0.20		.24 0.23	c) or (24 0.23	0.23	0.23	0.24	0.25	0.25		(25)
(20)111- 0.27 0.20 0.20	0.20 0	0.20	0.20	0.20	0.20	0.24	0.20	0.20		(=3)
3. Heat losses and heat los	·	N 1 4 A				A 3/11				A 3/ 1
3. Heat losses and heat los ELEMENT Gross area (m²)	os parameter: Openings m²	Net Ar A ,ı		U-valu W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gross	Openings						<)			
ELEMENT Gross area (m²)	Openings	, A	m ²	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Openings	A ,ı	m² x 2 x ¹ / ₂	W/m2	K = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,1 2.6	m ² x 2 x ¹ / ₃ x ¹ / ₄	W/m2 1.2 /[1/(1.2)+	K = 0.04] = 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	2.6 13.52 2.73	m ² x 2 x ¹ / ₃ x ¹ / ₃ x ¹ / ₃	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	K = 0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,1 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Openings	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 3.2	Openings m² 34.06	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3	Openings m² 34.06 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79 3.2 43.03	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Floor Type 1 Second Secon	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.75 3.2 43.07 28.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99 10.55	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

											_			_
Party o	_					62.16					L			(32b)
					ndow U-va Is and part		ated using	ı formula 1,	/[(1/U-valu	e)+0.04] a	as given in	paragraph	3.2	
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	: TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	_		ere the de tailed calci		constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<					Ī	37.2	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)						_		
Total fa	abric he	at loss							(33) +	(36) =		[108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	У			1	(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		_
Heat Id	ss para	meter (H	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	133.41	(39)
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
									,	Average =	Sum(40) ₁ .	12 /12=	1.21	(40)
Numbe	er of day		nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
											<u> </u>			
4. Wa	iter heat	ing ener	gy requ	irement:								kWh/ye	ear:	
Assum if TF	ed occu A > 13.9	ipancy, I 9, N = 1	N + 1.76 x		(-0.0003	349 x (TF	-A -13.9)2)] + 0.(0013 x (ΓFA -13.		kWh/ye	ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ipancy, I 9, N = 1 9, N = 1	N + 1.76 x	[1 - exp		•		, ,-	,	ΓFA -13.	.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da 5% if the o	ay Vd,av	erage = designed t)2)] + 0.0 (25 x N) to achieve	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ed occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by	es per da	ay Vd,av	erage = designed t	(25 x N)	+ 36 a water us		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	82	ar:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb	N + 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	y Vd,avelling is not and con Jun	erage = designed to designed to designed to designed to designed to design desi	(25 x N) to achieve Aug	+ 36 a water us Sep	se target o	9) 10°	82 1.09 Dec	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa litres per I Feb	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us Sep 99.07	Oct	9) / / Nov	1.09 Dec		(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual of that 125 Jan er usage ii	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avi welling is not and con Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Fotal = Su	9) Nov 107.16 m(44) ₁₁₂ =	1.09 Dec 111.2	ear: 1213.1	, ,
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ppancy, I P, N = 1 P, N = 1 e hot wanter and average litres per properties of the second of the	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by r day (all w Apr ach month 99.07	es per da 5% if the of the orater use, I May $Vd,m = fa$ 95.03 I I I I I I I I	y Vd,avi welling is not and con Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Fotal = Su th (see Ta	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	Dec 111.2 c, 1d)		(43)
Assumif TF if TF Annua Reduce not more Hot wate (44)m=	ed occu A > 13.9 A £ 13.9 I averag the annual of that 125 Jan er usage ii	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avi welling is not and con Jun ctor from 1	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ed occu A > 13.9 A £ 13.9 I averag the annual e that 125 Jan 111.2	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = far$ 95.03 $onthly = 4$.	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,ri 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07 0 kWh/more	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	led occu A > 13.9 A £ 13.9 I average the annual ethat 125 Jan 111.2 content of 164.91 taneous w	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all which month general ge	es per da 5% if the orater use, I May $Vd,m = fa$ 95.03 $onthly = 4$.	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,ri 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07 0 kWh/more	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan er usage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x Atter usage hot water person per Mar day for ear 103.11 148.83 Ang at point 22.32	ge in litre usage by a day (all was Apr ach month 99.07 culated month 129.76 for use (not 19.46	es per da 5% if the a vater use, I May Vd,m = fa 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,avelwelling is not and constant from 1 90.98 190 x Vd,rd 107.44 storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/more 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag	ed occu A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 111.2 content of 164.91 taneous w 24.74 storage e volum	ipancy, I ipancy, I	N + 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal 148.83 ng at point 22.32 includir	ge in litre usage by a day (all we have month general section of the section of t	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/more 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instant (46)m= Water Storag If comm	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 111.2 content of 164.91 taneous w 24.74 storage e volum munity h	ppancy, I P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss: e (litres) eating a	N + 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal 148.83 ag at point 22.32 includir nd no ta	ge in litre usage by r day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the of	ay Vd,avelwelling is not and constant of and constant of and constant of an area of a storage), and a storage)	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water	ed occu A > 13.9 A £ 13.9 I average the annual that 125 Jan Taneous we 1111.2 content of 164.91 taneous we 24.74 storage e volume munity he vise if no	Ipancy, I P, N = 1 e hot wa al average litres per p Feb 107.16 hot water 144.23 vater heatin 21.63 loss: e (litres) eating a p stored loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal hot water sale includir and no tal hot water sale includir sale inc	ge in litre usage by a day (all we have ach month general 129.76 graph and any sound a	es per da 5% if the o rater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)
Assumif TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If commother Water a) If m	led occu A > 13.9 A £ 13.9 I average the annual that 125 Jan 111.2 content of 164.91 taneous w 24.74 storage e volum munity he vise if no storage tanufact	pancy, I Po, N = 1 Po, N = 1 Po hot was Po litres per p 107.16 Pot water 144.23 Pater heatin 21.63 Toss: Pot litres Pot litres Pot water 21.63 Pot litres Pot water 21.63 Pot litres Pot water 21.63 Pot water heatin 21.63 Pot	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal hot water sale includir and no tal hot water sale includir sale inc	ge in litre usage by a day (all was Apr ach month 99.07 Culated month 129.76 19.46 Ing any so ank in dwar (this in dward coss factors)	es per da 5% if the of	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame ves	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 c 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water stor	•			(48) x (49) =		1	10		(50)
b) If manufacturer's declar	•								1	(54)
Hot water storage loss fact If community heating see s	,	KVVII/IIII e/u	ay)				0.	.02		(51)
Volume factor from Table 2							1.	.03]	(52)
Temperature factor from Ta	ıble 2b						0	0.6]	(53)
Energy lost from water stor	age, kWh/year			(47) x (51) x (52) x (53) =	1.	.03]	(54)
Enter (50) or (54) in (55)							1.	.03		(55)
Water storage loss calculate	ed for each mon	th		((56)m = (55) × (41)	m			_	
(56)m= 32.01 28.92 32.			32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated sola	r storage, (57)m = (5	66)m x [(50) –	(H11)] ÷ (5	60), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 32.01 28.92 32.	01 30.98 32.	01 30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annua) from Table 3							0		(58)
Primary circuit loss calcula		` ,	` '	` '						
(modified by factor from								1	1	(50)
(59)m= 23.26 21.01 23.	26 22.51 23.	26 22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for e	ach month (61)n	$1 = (60) \div 3$	65 × (41)m						
(61)m= 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water	r heating calcula	ated for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)n	n
(62)m= 220.18 194.16 204	.11 183.25 179	.78 160.93	154.83	169.52	169.1	190	200.56	214.98		(62)
Solar DHW input calculated using	Appendix G or Appe	endix H (negat	ive quantit	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines if FGH	RS and/or WWF	IRS applies	s, see Ap	pendix (G)				,	
(63)m = 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater			1		ı	ı	1	1	1	
(64)m= 220.18 194.16 204	.11 183.25 179	.78 160.93	154.83	169.52	169.1	190	200.56	214.98		_
					out from wa		· ·		2241.41	(64)
Heat gains from water heat				1	i	i]	
(65)m= 99.05 87.9 93.	71 85.94 85.	62 78.52	77.32	82.21	81.23	89.02	91.69	97.32		(65)
include (57)m in calculat	on of (65)m only	if cylinder	is in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains (see Tab	le 5 and 5a):									
Metabolic gains (Table 5),	Natts							1	1	
	ar Apr M	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 168.99 168.99 168	.99 168.99 168	.99 168.99	168.99	168.99	168.99	168.99	168.99	168.99		(66)
Lighting gains (calculated i	n Appendix L, eq	uation L9 c	r L9a), a	lso see	Table 5				•	
(67)m= 60.61 53.84 43.	78 33.15 24.	78 20.92	22.6	29.38	39.43	50.07	58.44	62.3		(67)
Appliances gains (calculate	d in Appendix L,	equation L	.13 or L1	3a), also	see Ta	ble 5				
(68)m= 405.91 410.12 399	0.5 376.91 348	.38 321.58	303.67	299.45	310.07	332.66	361.19	388		(68)
Cooking gains (calculated	n Appendix L, ed	uation L15	or L15a), also se	ee Table	5			-	
(69)m= 54.72 54.72 54.	72 54.72 54.	72 54.72	54.72	54.72	54.72	54.72	54.72	54.72		(69)
Pumps and fans gains (Tal	ole 5a)								_	
(70)m= 0 0 0	0 0	0	0	0	0	0	0	0		(70)
Losses e.g. evaporation (n	egative values) (Table 5)								
(71)m= -112.66 -112.66 -112	.66 -112.66 -112	.66 -112.66	-112.66	-112.66	-112.66	-112.66	-112.66	-112.66		(71)

Water heat	ng gains (1	Table 5)												
(72)m= 133.	 	125.95	119.36	115.08	10	09.05	103.93	110	.49 112.83	119.6	5 127.35	130.81		(72)
Total inter	nal gains =	 :		ļ		(66)	m + (67)m	ı + (68	3)m + (69)m + ((70)m +	(71)m + (72)	m	l	
(73)m= 710		680.28	640.46	599.29	5	62.59	541.24	550	.37 573.37	613.4	3 658.03	692.15		(73)
6. Solar ga	ains:													
		using sola	r flux from	Table 6a	and	l associ	ated equa	tions	to convert to th	e applic	able orientat	ion.		
Orientation			Area			Flu			9_		FF		Gains	
	Table 6d		m²			Tab	le 6a		Table 6b		Table 6c		(W)	
Northeast 0.9	9x 0.54	Х	13.	52	X	1	1.28	x	0.24	x	0.7	=	12.46	(75)
Northeast 0.9	9x 0.77	X	2.7	73	X	1	1.28	x	0.24	x	0.7	=	3.59	(75)
Northeast 0.9	0.77	х	4.′	16	x	1	1.28	x	0.24	X	0.7	_	5.46	(75)
Northeast 0.9	0.54	х	13.	52	x	2:	2.97	x	0.24	x	0.7	=	25.35	(75)
Northeast 0.9	9x 0.77	Х	2.7	73	X	2	2.97	x	0.24	x	0.7	=	7.3	(75)
Northeast 0.9	0.77	х	4.′	16	x	2	2.97	x	0.24	x	0.7	=	11.12	(75)
Northeast 0.9	0.54	х	13.	52	x	4	1.38	x	0.24	x	0.7	=	45.68	(75)
Northeast 0.9	0.77	х	2.7	73	x	4	1.38	x	0.24	X	0.7	=	13.15	(75)
Northeast 0.9	0.77	х	4.′	16	X	4	1.38	x	0.24	x	0.7	=	20.04	(75)
Northeast 0.9	0.54	x	13.	52	X	6	7.96	x	0.24	x	0.7		75.02	(75)
Northeast 0.9	0.77	X	2.7	73	X	6	7.96	x	0.24	×	0.7	=	21.6	(75)
Northeast 0.9	0.77	x	4.′	16	X	6	7.96	x	0.24	x	0.7	=	32.91	(75)
Northeast 0.9	0.54	x	13.	52	X	9	1.35	x	0.24	x	0.7		100.84	(75)
Northeast 0.9	0.77	X	2.7	73	X	9	1.35	x	0.24	×	0.7	=	29.03	(75)
Northeast 0.9	9x 0.77	х	4.	16	X	9	1.35	x	0.24	×	0.7		44.24	(75)
Northeast 0.9	0.54	x	13.	52	X	9	7.38	x	0.24	x	0.7		107.5	(75)
Northeast 0.9	9x 0.77	X	2.7	73	X	9	7.38	x	0.24	×	0.7	=	30.95	(75)
Northeast 0.9	0.77	х	4.	16	X	9	7.38	x	0.24	×	0.7	=	47.17	(75)
Northeast 0.9	0.54	x	13.	52	X	9	1.1	x	0.24	x	0.7		100.56	(75)
Northeast 0.9	0.77	х	2.7	73	x	9	1.1	x	0.24	×	0.7	=	28.96	(75)
Northeast 0.9	0.77	x	4.	16	X	9	1.1	x	0.24	×	0.7	=	44.12	(75)
Northeast 0.9	0.54	х	13.	52	x	7:	2.63	x	0.24	x	0.7	=	80.17	(75)
Northeast 0.9	0.77	х	2.7	73	x	7.	2.63	x	0.24	×	0.7	=	23.08	(75)
Northeast 0.9	0.77	х	4.′	16	x	7.	2.63	x	0.24	x	0.7	=	35.17	(75)
Northeast 0.9	0.54	x	13.	52	X	5	0.42	x	0.24	x	0.7		55.66	(75)
Northeast 0.9	0.77	х	2.7	73	x	5	0.42	x	0.24	×	0.7	=	16.03	(75)
Northeast 0.9	0.77	x	4.	16	X	5	0.42	x	0.24	×	0.7		24.42	(75)
Northeast 0.9	0.54	x	13.	52	X	2	8.07	x	0.24	x	0.7	=	30.98	(75)
Northeast 0.9	9x 0.77	х	2.7	73	x	2	8.07	x	0.24	X	0.7	=	8.92	(75)
Northeast 0.9	9x 0.77	х	4.	16	x	2	8.07	x	0.24	×	0.7	=	13.59	(75)
Northeast 0.9	0.54	х	13.	52	x	1	4.2	x	0.24	X	0.7	=	15.67	(75)
Northeast 0.9	9x 0.77	x	2.7	73	x	1	4.2	x	0.24	x	0.7		4.51	(75)

North cost a a F		_			_		_		_ ,				— ,
Northeast 0.9x	0.77	×	4.1	6	X L	14.2	X	0.24	×	0.7	=	6.88	(75)
Northeast _{0.9x}	0.54	X	13.5	52	X _	9.21	X	0.24	×	0.7	_ =	10.17	(75)
Northeast _{0.9x}	0.77	X	2.7	3	X L	9.21	×	0.24	×	0.7	=	2.93	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x _	9.21	X	0.24	X	0.7	=	4.46	(75)
Southwest _{0.9x}	0.77	X	7.5	4	x	36.79	╛	0.24	X	0.7	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	62.67		0.24	X	0.7	=	55.02	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	85.75		0.24	x	0.7	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	106.25		0.24	x	0.7	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	119.01		0.24	x	0.7	=	104.47	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x	118.15		0.24	x	0.7	=	103.72	(79)
Southwest _{0.9x}	0.77	x	7.5	4	x	113.91	Ī	0.24	x	0.7	=	99.99	(79)
Southwest _{0.9x}	0.77	X	7.5	4	x F	104.39	Ŧ	0.24	x	0.7	=	91.64	(79)
Southwest _{0.9x}	0.77	x	7.5	4	х	92.85	Ħ	0.24	= x	0.7		81.51	(79)
Southwest _{0.9x}	0.77	x	7.5	4	x F	69.27	i	0.24	x	0.7		60.81	(79)
Southwest _{0.9x}	0.77	X	7.5		x $\overline{}$	44.07	Ħ	0.24	x	0.7	_	38.69	(79)
Southwest _{0.9x}	0.77	×	7.5	==	x	31.49	╡	0.24	x	0.7	= =	27.64	(79)
Northwest _{0.9x}	0.77	×	3.5		x	11.28	X	0.24	_ x	0.7	= =	4.61	(81)
Northwest 0.9x	0.77	X	3.5		x \lceil	22.97	X	0.24	x	0.7	= =	9.39	(81)
Northwest _{0.9x}	0.77		3.5		×	41.38	ן ^ χ	0.24	^	0.7		16.91	(81)
Northwest 0.9x		=			 		╡		╡ ¦		=		= ' '
Northwest 0.9x	0.77	X	3.5		x _	67.96	」 × ¬	0.24	X	0.7	_ =	27.77	(81)
Northwest 0.9x	0.77	X	3.5		× L	91.35	X	0.24	X	0.7	_ =	37.33	(81)
<u> </u>	0.77	×	3.5		× L	97.38	×	0.24	X	0.7	=	39.8	(81)
Northwest 0.9x	0.77	×	3.5	1	X L	91.1	×	0.24	×	0.7	=	37.23	(81)
Northwest _{0.9x}	0.77	X	3.5	1	× L	72.63	X	0.24	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	X	3.5	1	X L	50.42	X	0.24	X	0.7	=	20.6	(81)
Northwest _{0.9x}	0.77	X	3.5	1	X _	28.07	X	0.24	X	0.7	=	11.47	(81)
Northwest _{0.9x}	0.77	X	3.5	1	x	14.2	X	0.24	X	0.7	=	5.8	(81)
Northwest _{0.9x}	0.77	X	3.5	1	X	9.21	X	0.24	X	0.7	=	3.77	(81)
Solar gains in								n = Sum(74)m				7	
(83)m= 58.42		171.06	250.57	315.91	329		259	.75 198.22	125.77	71.55	48.97		(83)
Total gains – ir			`		`	, ·						7	
(84)m= 769.12	813.98	851.34	891.03	915.2	891	72 852.11	810	.12 771.59	739.2	729.57	741.12		(84)
7. Mean inter	nal tempe	rature	(heating	season)								
Temperature	during he	ating p	eriods in	the livi	ng ar	ea from Ta	able 9	Th1 (°C)				21	(85)
Utilisation fac	tor for gai	ns for I	iving are	a, h1,m	(see	Table 9a))						
Jan	Feb	Mar	Apr	May	Jı			ug Sep	Oct	Nov	Dec]	
(86)m= 1	0.99	0.99	0.97	0.93	0.8	1 0.64	0.6	0.89	0.98	0.99	1	7	(86)
Mean internal	tempera	ture in	living are	ea T1 (f	Jlow	stens 3 to	7 in 7	able 9c)	•		•	_	
(87)m= 19.74	19.85	20.06	20.37	20.67	20.	i	20.	<u> </u>	20.44	20.04	19.72	7	(87)
` '							-	Į.		1		J	` '
Temperature					_	_ `	1	<u> </u>	40.01	40.04	40.04	7	(00)
(88)m= 19.9	19.9	19.9	19.91	19.91	19.	19.92	19.	93 19.92	19.91	19.91	19.91		(88)

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	h2.m (se	ee Table	9a)						
(89)m=	0.99	0.99	0.99	0.96	0.89	0.72	0.5	0.56	0.83	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)				
(90)m=	18.24	18.4	18.71	19.16	19.57	19.85	19.91	19.91	19.76	19.26	18.69	18.21		(90)
		ı							1	LA = Livin	g area ÷ (4	4) =	0.14	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = f	LA × T1	+ (1 – fL	A) x T2					_
(92)m=	18.45	18.6	18.9	19.33	19.73	20	20.06	20.06	19.91	19.43	18.88	18.43		(92)
Apply	adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.45	18.6	18.9	19.33	19.73	20	20.06	20.06	19.91	19.43	18.88	18.43		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
ille u	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>				7.09	T GOP			200		
(94)m=	0.99	0.99	0.98	0.95	0.89	0.72	0.52	0.57	0.83	0.96	0.99	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m=	763.17	804.92	834.49	850.77	810.96	645.93	445.84	464.75	638.51	708.01	719.86	736.3		(95)
			rnal tem	i —						.	ı			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
							=[(39)m :	-``	- 		4575.0	4044 77		(07)
		1853.33		1391.97	1069.2	710.74	456.18	480.77	768.26	1176	1575.8	1911.77		(97)
(98)m=	859.31	704.53	624.14	389.67	192.13	0	$\frac{th = 0.02}{o}$	0	0	348.18	616.28	874.55		
(00)111=	000.01	101.00	02	000.01	102.10			<u> </u>	l per year	<u> </u>		<u> </u>	4608.78	(98)
Snac	e heatin	a requir	ement in	k\/\/h/m²	!/vear					(,(-	- / 10,012	41.79	」`
		• .			•								41.79	
			nts – Cor	· ·			ater heat	ting prov	ided by	a comm	unity sch	nama		
				• .		-	heating (• .	-		urnty 301		0	(301)
Fractio	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme ma	y obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and	up to four	other heat	sources; ti	he latter	_
includes	boilers, h	neat pump	s, geotheri	mal and wa			r stations.			•		,		_
Fraction	on of hea	at from C	Commun	ity CHP									0.13	(303a)
Fraction	on of cor	mmunity	heat fro	m heat s	ource 2								0.87	(303b)
Fraction	on of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fractio	on of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for d	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	g										!	kWh/year	_
-		_	requiren	nent									4608.78	
Space	heat fro	m Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	=	629.1	(307a)
														_

Space heat from heat source 2					_
Space heating requirement from secondary/supplementary system (88 × (301) × 100 + (508) = 0 0.000	Space heat from heat source 2		(98) x (304b) x (305) x (306) =	4210.12	(307b)
Water heating Annual water heating requirement 2241.41 If DHW from community scheme: 2241.41 Water heat from Community CHP (64) x (303a) x (306) x (306) = 305.95 (310a) Water heat from heat source 2 (64) x (303a) x (305) x (306) = 2047.53 (310a) Electricity used for heat distribution 0.01 x ((307a)(307e) + (310a)(310e)] = 71.93 (313) Cooling System Energy Efficiency Ratio 0.01 x ((307a)(307e) + (310a)(310e)] = 0.01316 Space cooling (if there is a fixed cooling system, if not enter 0) = (1971 + (314) = 0.01316 Electricity for pumps and fans within dwelling (Table 4f): 253.98 (330a) warm air heating system fans 0.0330e) 2253.98 (330a) warm air heating system fans 0.0330e) 253.98 (331) Energy for lighting (calculated in Appendix M) (negative quantity) 235.39 (331) Energy for lighting (calculated in Appendix M) (negative quantity) 235.75 (333) Electricity generated by PVs (Appendix M) (negative quantity) 725.75 (333) Electricity generated by wind turbine (Appendix M) (196.0	Efficiency of secondary/supplementary	heating system in % (from Tab	le 4a or Appendix E)	0	(308
Annual water heating requirement	Space heating requirement from secon	ndary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heat from Community CHP (64) x (303a) x (305b) x (306b) = (301a) 305.96 (310a) Water heat from heat source 2 (64) x (303b) x (305b) x (306b) = (2047.53 (310b)) 2047.53 (310b) Electricity used for heat distribution 0.01 x ((307a) (307e) + (310a) (310e)] + (71.93 (313) (313) Cooling System Energy Efficiency Ratio 0 (314) (315) Space cooling (if there is a fixed cooling system, if not enter 0) = (1077 + (314) = (300a) + (310a) (310e)] + (310a) 0 (330a) Warm air heating system fans belanced, extract or positive input from outside warm air heating system fans pump for solar water heating 0 (330a) Total electricity for the above, kWh/year = (330a) + (330b) + (330g) = (253.98 (331)) (330a) Energy for lighting (calculated in Appendix L) 425.18 (332) (332) Electricity generated by wind turbine (Appendix M) (negative quantity) -235.75 (333) (330a) 10b. Fuel costs – Community heating scheme Fuel Price (Table 12) Fuel Cost (Yyear Fuel Price (Table 12) Fuel Cost (Yyear Space heating from CHP (307a) x 2.97 x 0.01 = (70.00) (340a) Water heating from heat source 2 (307b) x 4.24 x 0.01 = (70.00) 9.09 (342a) Water heating from heat				2241.41	7
Water heat from heat source 2	•		(64) y (303a) y (305) y (306) -	205.05	
Electricity used for heat distribution	·				╡`
Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) + (314) =		0.0			=
Space cooling (if there is a fixed cooling system, if not enter 0)	•		(0.00)		Ⅎ`
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans Do (330a) pump for solar water heating Total electricity for the above, kWh/year = (330a) + (330b) + (330g) = 253.98 (331) Energy for lighting (calculated in Appendix L) Electricity generated by PVs (Appendix M) (negative quantity) Electricity generated by wind turbine (Appendix M) (negative quantity) Do (334) 10b. Fuel costs - Community heating scheme Fuel kWh/year (Table 12) Space heating from CHP (307a) x (2.97 x 0.01 = 18.68 (340a) Space heating from heat source 2 (307b) x (4.24 x 0.01 = 178.51 (340b) Water heating from heat source 2 (310b) x (2.97 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x (4.24 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x (4.24 x 0.01 = 86.82 (342b) Pumps and fans (331) (311) (311) x 0.01 = 66.48 (350) Additional standing charges (Table 12) (351) Energy for lighting (332) (311) x 0.01 = 56.48 (350) Additional standing charges (Table 12) (351) Energy saving/generation technologies Item 1 (31.19 x 0.01 = 31.1 (352) Total energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (352) Energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (352) Total energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost deflator (Table 12) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost factor (ECF) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost factor (ECF) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost factor (ECF) (355) x (356) + (44.4 x 0.01 = 31.1 (356) Energy cost factor (ECF) (355) x (356) + (44.4 x 0.01 = 31.1 (350) Energy cost factor (ECF) (355) x (356) + (44.4 x 0.01 = 31.1 (350)			= (107) ÷ (314) =		╡```
mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans 253.98 (330a) (330b) (330b) (330b) (330b) (330b) (330b) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (330g) (331) (331) (331) (331) (332) (331) (332) (332) (333) (332) (333) (331) (330g)		,	(1617)	Ŭ	(0.0)
Dump for solar water heating		<u> </u>	е	253.98	(330a)
Total electricity for the above, kWh/year = (330a) + (330b) + (330g) = 253.98 (331) Energy for lighting (calculated in Appendix L)	warm air heating system fans			0	(330b)
Energy for lighting (calculated in Appendix L) Electricity generated by PVs (Appendix M) (negative quantity) Electricity generated by wind turbine (Appendix M) (negative quantity) 10b. Fuel costs - Community heating scheme Fuel KWh/year Fuel Price (Table 12) Space heating from CHP (307a) x (307b) x (307b) x (307c)	pump for solar water heating			0	(330g)
Electricity generated by PVs (Appendix M) (negative quantity) Electricity generated by wind turbine (Appendix M) (negative quantity) 10b. Fuel costs – Community heating scheme Fuel kWh/year Fuel Price (Table 12) Space heating from CHP (307a) x 2.97	Total electricity for the above, kWh/yea	ar	=(330a) + (330b) + (330g) =	253.98	(331)
Electricity generated by wind turbine (Appendix M) (negative quantity)	Energy for lighting (calculated in Appel	ndix L)		428.18	(332)
Space heating from CHP (307a) x (2.97	Electricity generated by PVs (Appendix	KM) (negative quantity)		-235.75	(333)
Fuel kWh/year Fuel Cost kWh/year Fuel Price (Table 12) Fuel Cost £/year Space heating from CHP (307a) x 2.97 x 0.01 = 18.68 (340a) Space heating from heat source 2 (307b) x 4.24 x 0.01 = 178.51 (340b) Water heating from CHP (310a) x 2.97 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x 4.24 x 0.01 = 86.82 (342b) Fuel Price Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies Item 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = (350) Total energy cost deflator (Table 12) Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) ((355) x (356)] ÷ [(4) + 45.0] = (1.28 (357)	Electricity generated by wind turbine (A	Appendix M) (negative guantity)		0	(334)
kWh/year (Table 12) £/year Space heating from CHP (307a) x 2.97 x 0.01 = 18.68 (340a) Space heating from heat source 2 (307b) x 4.24 x 0.01 = 178.51 (340b) Water heating from CHP (310a) x 2.97 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x 4.24 x 0.01 = 86.82 (342b) Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies Item 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) Total energy cost deflator (Table 12) Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)	Electricity generated by wind tarbine (The second of th			
Space heating from heat source 2 (307b) x 4.24 x 0.01 = 178.51 (340b) Water heating from CHP (310a) x 2.97 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x 4.24 x 0.01 = 86.82 (342b) Fuel Price Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies Item 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)		,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,			
Water heating from CHP (310a) x 2.97 x 0.01 = 9.09 (342a) Water heating from heat source 2 (310b) x 4.24 x 0.01 = 86.82 (342b) Fuel Price Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies Item 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)		scheme	Fuel Price	Fuel Cost	
Water heating from heat source 2 (310b) x 4.24 x 0.01 = 86.82 (342b) Fuel Price Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies ltem 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)	10b. Fuel costs – Community heating	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Fuel Price Pumps and fans (331) Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost Energy cost deflator (Table 12) Energy cost deflator (Table 12) Energy cost factor (ECF) (331) 13.19 × 0.01 = 33.5 13.19 × 0.01 = 56.48 (350) 13.19 × 0.01 = -31.1 (352) 471.98 (355) 1.28 (356)	10b. Fuel costs – Community heating Space heating from CHP	Fuel kWh/year (307a) x	Fuel Price (Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
Pumps and fans (331) 13.19 x 0.01 = 33.5 (349) Energy for lighting (332) 13.19 x 0.01 = 56.48 (350) Additional standing charges (Table 12) 120 (351) Energy saving/generation technologies ltem 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)	10b. Fuel costs – Community heating Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68	(340a) (340b)
Energy for lighting (332) Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost = (340a)(342e) + (345)(354) = 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = [13.19] x 0.01 = 56.48 (350) 120 (351) 120 (351) 471.98 (355) 13.19 x 0.01 = -31.1 (352) 471.98 (355)	10b. Fuel costs – Community heating Space heating from CHP Space heating from heat source 2 Water heating from CHP	Fuel kWh/year (307a) x (307b) x (310a) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09	(340a) (340b) (342a)
Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost = (340a)(342e) + (345)(354) = 13.19 × 0.01 = -31.1 (352) 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) × (356)] ÷ [(4) + 45.0] = 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82	(340a) (340b) (342a) (342b)
Energy saving/generation technologies Item 1 13.19 x 0.01 = -31.1 (352) Total energy cost = (340a)(342e) + (345)(354) = 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 45.0] = 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82	(340a) (340b) (342a) (342b) (349)
Item 1 13.19 \times $0.01 =$ -31.1 (352) Total energy cost $= (340a)(342e) + (345)(354) =$ 471.98 (355) 11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) 0.42 (356) Energy cost factor (ECF) $[(355) \times (356)] \div [(4) + 45.0] =$ 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82	(340a) (340b) (342a) (342b) (349) (350)
11b. SAP rating - Community heating scheme Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) × (356)] ÷ [(4) + 45.0] = 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48	(340a) (340b) (342a) (342b) (349) (350)
Energy cost deflator (Table 12) Energy cost factor (ECF) [(355) × (356)] ÷ [(4) + 45.0] = 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48 120	(340a) (340b) (342a) (342b) (349) (350) (351)
Energy cost factor (ECF) $[(355) \times (356)] \div [(4) + 45.0] =$ 1.28 (357)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48 120 -31.1	(340a) (340b) (342a) (342b) (349) (350) (351)
	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48 120 -31.1	(340a) (340b) (342a) (342b) (349) (350) (351)
SAP rating (section12) 82.19 (358)	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost 11b. SAP rating - Community heating	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48 120 -31.1 471.98	(340a) (340b) (342a) (342b) (349) (350) (351) (352) (355)
	Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1 Total energy cost 11b. SAP rating - Community heating Energy cost deflator (Table 12)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (331) (332) (332) = (340a)(342e) + (345)(354) = scheme	Fuel Price (Table 12) 2.97	Fuel Cost £/year 18.68 178.51 9.09 86.82 33.5 56.48 120 -31.1 471.98	(340a) (340b) (342a) (342b) (349) (350) (351) (352) (355)

12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	998.57 ×	0.22	215.69	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	305.56 ×	0.52	-158.59	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	485.64 ×	0.22	104.9	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	148.61 X	0.52	-77.13	(366)
Efficiency of heat source 2 (%)	If there is CHP us	ing two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	! [(307b)+(310b)] x 100 ÷ (367b) x	0.22	1397.78	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 37.33	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	72)	= 1519.98	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantar	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		1519.98	(376)
CO2 associated with electricity for	pumps and fans within dwe	lling (331)) x	0.52	= 131.81	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 222.22	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as appli	cable	0.52 × 0.01 =	-122.35	」 (380)
Total CO2, kg/year	sum of (376)(382) =	<u> </u>	0.02	1751.67	」、 (383)
Dwelling CO2 Emission Rat	te (383) ÷ (4) =			15.88	(384)
El rating (section 14)				84.88	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	998.57 ×	1.22	1218.25	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	305.56 ×	3.07	-938.08	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	485.64 ×	1.22	592.48	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	148.61 ×	3.07	-456.22	(366)
Efficiency of heat source 2 (%)	If there is CHP us	ing two fuels repeat (363) to	0 (366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)+(310b)] x 100 ÷ (367b) x	1.22	7894.86	(368)
Electrical energy for heat distribution	on	[(313) x		= 220.82	(372)
Total Energy associated with comm	nunity systems	(363)(366) + (368)(37		= 8532.11	(373)
if it is negative set (373) to zero (unless specified otherwise	see C7 in Appendix (C)	8532.11	(373)
					_

Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or insta	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			8532.11	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans within o	dwelling (331)) x	3.07	=	779.71	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1314.51	(379)
Energy saving/generation technologies	_				7,
Item 1		3.07 × 0.0	T =	-723.74	(380)
Total Primary Energy, kWh/year sum of (370	6)(382) =			9902.59	(383)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 1-	1-Green				
Address: 1. Overall dwelling dime	pnoiono:								
1. Overall dwelling diffie	#1151U115.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) -	74.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = Ī	0	x	20 =	0	(6b)
Number of intermittent fa	ins				0	x '	10 =	0	(7a)
Number of passive vents	3			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_					
		_	. _ \	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(/ , ,	00		o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
- 		•	-	-	-	-	-	•	

	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	7	
	ctive air chang	e rate for t	the appli	cable ca	se	<u> </u>	ļ	<u>!</u>		Į.		
	al ventilation:	and the NL (6	201-) (00-	-) - - - (-		.IE\\ - (b -) (00 -)			0.5	(2
	eat pump using A) = (23a)			0.5	(2
	heat recovery: e	-	_					Ola) (/	201.) [4 (00.0	76.5	(2
a) if balance 4a)m= 0.28	d mechanical		0.25	at recove	0.24	1R) (248 0.24	0.24	2b)m + (2 0.25	23D) × [0.26	0.27) ÷ 100]]	(2
, r	d mechanical	!	<u>!</u>		<u> </u>	<u> </u>	<u>!</u>	ļ!		0.21	_	(2
b) ii balance lb)m= 0		0 verillation	T without	0	0	0	0	0	0	0	1	(
c) If whole h	ouse extract v	/entilation	or positiv	/e input v	Lventilatio	n from o	L outside		-			`
lc)m= 0	0 0	0	0	0	0	0	0	0	0	0	1	(
,	ventilation or ventilation or ventilation or ventilation or ventilation (24)		•					0.5]			_	
1d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
Effective air	change rate -	enter (24a	a) or (24k	o) or (24	c) or (24	d) in box	k (25)				_	
5)m= 0.28	0.28 0.27	7 0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(
. Heat losses	s and heat los	s paramet	er:									
EMENT	Gross area (m²)	Openir		Net Ar A ,r		U-valı W/m2		A X U (W/h	<)	k-valu kJ/m²·		A X k kJ/K
oors				2.6	х	1.2	= [3.12				(2
ndows Type	: 1			3.26	x1.	/[1/(1.2)+	0.04] =	3.73				(
indows Type	: 2			3.95	x1.	/[1/(1.2)+	0.04] =	4.52				(
indows Type	: 3			5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(
indows Type	: 4			0.65	x1.	/[1/(1.2)+	0.04] =	0.74				(
				14.69) x	0.11	= [1.6159				(
oor					\neg			7.00	_ [
	67.78	20.5	8	47.2	X	0.15	=	7.08				(
alls Type1	67.78	20.5	=	47.2 21.87	=	0.15	= [= [3.28				
alls Type1 alls Type2			=		7 X		=					(
alls Type1 alls Type2 alls Type3	24.47	2.6	=	21.87	x x	0.15	=	3.28				(1)
oor alls Type1 alls Type2 alls Type3 otal area of e	24.47	2.6	=	21.87	7 x x 7	0.15	=	3.28				(1)
alls Type1 alls Type2 alls Type3 otal area of e arty wall	24.47	2.6	=	21.87 5.93 112.8	x x x 7 x	0.15	=	3.28 0.89				(
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor	24.47	2.6	=	21.87 5.93 112.8 12.38	7 X X 7 3 X	0.15	=	3.28 0.89				(((
alls Type1 alls Type2 alls Type3 atal area of e arty wall arty floor arty ceiling or windows and	24.47	2.6 0	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	7 x x x 7 3 x x 7 5 5	0.15 0.15	= [3.28 0.89 0	s given in	ı paragrapı	h 3.2	
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and include the area	24.47 5.93 lements, m²	2.6 0	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x x x x x x x x x x x x x x x x x x	0.15 0.15	= [= [= [/[(1/U-valu	3.28 0.89 0	s given in	paragrap	h 3.2	
alls Type1 alls Type2 alls Type3 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	24.47 5.93 lements, m² roof windows, uses on both sides of	2.6 0 see effective was internal was X X U)	indow U-va	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul	x x x x x x x x x x x x x x x x x x x	0.15 0.15	= [= [] = [] = []/[(1/U-value) + (32) =	3.28 0.89 0				()
alls Type1 alls Type2 alls Type3 alls Type3 atal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los eat capacity (armal mass	24.47 5.93 lements, m² roof windows, uses on both sides of the side	2.6 0 see effective water of internal water (A x U) (MP = Cm -	indow U-va lls and pan	21.87 5.93 112.8 12.38 59.37 74.06 alue calcul titions	x x x x x x x x x x x x x x x x x x x	0.15 0.15 0 of formula 1 (26)(30)	= [= [] = [] = [/[(1/U-value) + (32) = ((28)	3.28 0.89 0 0 0 0 0 0 0 10 10 10 10 1	?) + (32a). Medium	(32e) =	39.55	()

if details o			are not kn	own (36) =	= 0.15 x (3	1)						·		_
Total fal									` '	(36) =			57.74	(37)
Ventilati	т								` ′	·	(25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat tra	nsfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		_
Heat los	ss parar	meter (H	ILP), W/	′m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	74.07	(39)
(40)m=	1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01		
	•									Average =	Sum(40) ₁	12 /12=	1	(40)
Number	of days	s in mor	nth (Tabl	le 1a)		ı				ı		1		
_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wate	er heati	ng ener	gy requi	rement:								kWh/ye	ear:	
_														
Assume				[1 ovn	(0 0003	240 v (TE	FA -13.9	\2\1 + O (1012 v (TEA 12		.34		(42)
	۱۵.9 ۱£ 13.9		+ 1.76 X	[ı - exp	(-0.0003	949 X (11	-A -13.9)2)] + 0.0) X C I U	IFA - 13.	.9)			
Annual a		•	iter usac	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
Reduce th	ne annual	average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		0		(- /
not more t	that 125 l	litres per p	person per	day (all w	ater use, l	hot and co	ld)					_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy co	ontent of I	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
		!				Į.			_	rotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instanta	neous wa	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)			'		
(46)m=	21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water st	-					•		•				•		
Storage	volume	e (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comm	•	_			-			' '						
Otherwis			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water st	•		الممسما	ft-		(14) (1/4)	- /-l : \ .							(10)
,				oss facto	or is kno	wn (Kvvr	i/day):					0		(48)
Tempera												0		(49)
Energy I			•	-				(48) x (49)) =		1	10		(50)
Hot wate				cylinder l								02		(51)
If comm		_			- (v)	., 0, 00	7)					.02		(01)
Volume	-	_		-							1.	.03		(52)
Tempera				2b								.6		(53)
Energy I	lost fror	n water	storage	, kWh/ve	ear			(47) x (51)	x (52) x (53) =		.03		(54)
9, '				, , y .				. ,				VV.		()
Enter (5	50) or (5	54) in (5	55)						, , ,			.03		(55)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•		•	•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			1	1	l	
· /	"=."	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraint on the constraints on the constraint on the constraints of the constraints on the constraint on	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calcular (see 140.43) m in calcular (see 140.43) s (calcular 40.89) m ins (calcular 140.89)	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraint on the constraints on the constraint on the constraints of the constraints on the constraint on	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances ga (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction on the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction on the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculati	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. e	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial from the second seco	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. etc. (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculations (Calculations) (Calc	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25		0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

	_													_		_
Southwest _{0.9}	<u> </u>	x	0.6	S5	X	10	04.39			0.24	X	0.7	:	= <u>L</u>	7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7		- [59.56	(79)
Southwest _{0.9}	0.77	X	0.6	35	x	9	2.85]		0.24	Х	0.7	-	= [7.03	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	6	9.27]		0.24	x	0.7	-	= [44.43	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7		- [5.24	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7	-	- [28.27	(79)
Southwesto.9	0.77	X	0.6	35	x	4	4.07]		0.24	x	0.7	-	= [3.34	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	3	1.49]		0.24	x	0.7	-	= [20.2	(79)
Southwest _{0.9}	0.77	X	0.6	35	x	3	1.49			0.24	x	0.7		= [2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	= Su	ım(74)m .	(82)m			_		
(83)m= 45.3	3 83.51	130.97	190.29	238.71	24	18.23	234.64	196	.79	151.24	96.8	55.44	38.05	5		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts							_		
(84)m= 622.	79 656.94	684.4	712.62	729.21	71	10.09	679.62	649	.56	621.77	598.64	592.15	601.1	2		(84)
7. Mean in	ternal temp	perature	(heating	season)											
Temperatu	re during h	neating p	eriods ir	n the livi	ng a	area 1	from Tal	ole 9,	, Th′	1 (°C)				Г	21	(85)
Utilisation	factor for g	ains for l	living are	ea, h1,m	ı (se	ee Ta	ble 9a)			, ,				<u>L</u>		
Jai		Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec			
(86)m= 0.99	0.98	0.97	0.93	0.82	C).64	0.47	0.5	51	0.75	0.93	0.98	0.99			(86)
Mean inter	nal temnei	ature in	living ar	-a T1 (fo	الد	w ste	ns 3 to 7	7 in T	ahle	9c)		_ L				
(87)m= 20.1		20.45	20.69	20.89		0.98	21	2	$\overline{}$	20.95	20.73	20.41	20.14			(87)
` ′		ı		l				l								` '
Temperatu (88)m= 20.0	<u>_</u>	20.07	20.08	20.08	_	eiiing 20.1	20.1	20.	$\overline{}$	20.09	20.08	20.08	20.08	\Box		(88)
(88)m= 20.0	7 20.07	20.07	20.06	20.06		20.1	20.1	20.	·'	20.09	20.06	20.08	20.00	<u>'</u>		(00)
Utilisation	 _	1		· · ·			·	9a)						_		
(89)m = 0.99	0.98	0.96	0.91	0.77	C).55	0.37	0.4	1	0.67	0.91	0.97	0.99			(89)
Mean inter	nal tempei	ature in	the rest	of dwell	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)					
(90)m= 18.9	7 19.12	19.38	19.73	19.98	2	0.08	20.1	20.	.1	20.05	19.78	19.34	18.95	5		(90)
										f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean inter	nal tempei	ature (fo	r the wh	ole dwe	llind	g) = fl	LA × T1	+ (1	– fL	A) × T2						
(92)m= 19.2		19.66	19.98	20.22	_	0.32	20.33	20.		20.29	20.03	19.62	19.26	;		(92)
Apply adju	stment to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate	<u> </u>	!			
(93)m= 19.2	8 19.42	19.66	19.98	20.22	2	0.32	20.33	20.3	33	20.29	20.03	19.62	19.26	5		(93)
8. Space h	eating req	uirement														
Set Ti to th			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	:(76)m an	d re-ca	alcu	late	
the utilisati				1	_		Ι					1	ī	_		
Ja		Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec			
Utilisation					_			١.,		1		1		\neg		(0.4)
(94)m= 0.98	!	0.96	0.9	0.78).58	0.4	0.4	4	0.69	0.91	0.97	0.99			(94)
Useful gair (95)m= 612.3	i	, VV = (94 654.54	4)M X (84 643.07	4)m 569.19	10	20.20	271.17	284	44	430.33	542.31	F74.00	F02 F	7		(95)
` '				l	<u> </u>	08.39	2/1.1/	204	.41	430.33	542.31	574.22	592.5	<u>′</u>		(93)
Monthly av (96)m= 4.3		6.5	perature 8.9	11.7	_	9 8 14.6	16.6	16.	₄ T	14.1	10.6	7.1	4.2	\neg		(96)
Heat loss r				<u> </u>			<u> </u>					/.1	4.2	Ш		(50)
	72 1093.79	988.85	821.51	629.44	_	, VV =	272.05	285.	' T	453.67	J 697.08	930.55	1125.4	11		(97)
(0.7.11-		1 000.00	021.01	1 020.77		. 0.00		L 200	.55	100.01	337.00	1 300.00	1 . 120.5			(=:)

(98)m=	neating	g require	ement fo	r each m	nonth, k\	Wh/mont	th = 0.02	24 x [(97)	m - (95))m] x (4 ⁻	1)m			
_	386.42	304.34	248.73	128.48	44.83	0	0	0	0	115.15	256.56	396.43		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1880.94	(98)
Space	heating	g require	ement in	kWh/m²	/year							Ī	25.4	(99)
8c. Spa	ace co	oling req	uiremen	nt										
Calcula	ated fo	r June, J	luly and	August.	See Tal	ole 10b	T							
L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		·						and exte		·		— i		(100)
(100)m=	0	0 tor for lo	0	0	0	685.27	539.47	552.51	0	0	0	0		(100)
(101)m=	0	tor for lo	0	0	0	0.89	0.94	0.93	0	0	0	0		(101)
· · L				 (100)m x			0.54	0.00	0	Ů	Ů			(101)
(102)m=	0	0	0	0	0	608.06	508.87	511.09	0	0	0	0		(102)
_	لــــــــــــــــــــــــــــــــــــ	gains cal	culated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
•	-			r month,		lwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (*	102)m]x	(41)m	
(104)m=	0	0	0	0	0	103.63	156.51	127.74	0	0	0	0		
									Tota	= Sum(104)	= [387.89	(104)
Cooled									f C =	cooled	area ÷ (4	ł) =	0.6	(105)
Intermitt					0	0.05	0.05	0.05			0			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0 l = Sum((104)	0		(106)
Space c	coolina	reauiren	nent for	month =	(104)m	× (105)	× (106)r	n	TOLA	ı = Surrı(1 .U/1)	= [0	(100)
(107)m=	0	0	0	0	0	15.57	23.51	19.19	0	0	0	0		
_									Tota	= Sum(107)	=	58.27	(107)
Space o	cooling	requiren	nent in k	kWh/m²/y	ear/				(107)) ÷ (4) =		Ī	0.79	(108)
9b. Ene	rgy req	uiremen	nts – Cor	mmunity	booting									
	rt ic uca			,	nealing	scheme						_		
				iting, spa	ce cooli	ng or wa	ater heat	ting prov			unity sch	ieme.		7,004)
Fraction	of spa	ice heat	from se	iting, spa	ace cooli supplen	ng or wa	ater heat neating (ting prov (Table 11			unity sch	neme.	0	(301)
Fraction	of spa	ice heat	from se	iting, spa	ace cooli supplen	ng or wa	ater heat neating (unity sch	ieme.	0	(301)
Fraction Fraction The comm	n of spa n of spa munity so	ice heat ice heat theme may	from se from co	iting, spa condary/ mmunity	ace cooli 'supplen' system	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	neme.	1	╡`
Fraction Fraction The comm	n of spa n of spa munity so poilers, h	ice heat ice heat theme may eat pumps	from set from co obtain he g, geotherr	nting, space condary/ mmunity teat from se mal and wa	ace cooli 'supplen' system	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	[1	╡`
Fraction The commincludes be Fraction	n of spa n of spa munity so poilers, h n of hea	ace heat ace heat theme may eat pumps at from C	from ser from co obtain he s, geothern commun	nting, space condary/ mmunity teat from se mal and wa	ace cooli (supplem system everal sour este heat fi	ng or wanentary l 1 – (30° ces. The p	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one	·	[1 e latter	(302)
Fraction The comminctudes be Fraction Fraction	n of spa munity so boilers, h n of hea n of con	ace heat ace heat theme may eat pumps at from Community	from ser from con y obtain he s, geotherr commun heat from	iting, spa condary, mmunity eat from se mal and we ity CHP	ace cooli supplem system everal sour aste heat for	ng or wanentary I 1 — (30° ces. The prometors	ater heat neating (1) = procedure	(Table 11	1) '0' if n CHP and	one up to four (·	sources; th	1 e latter 0.13	(302)
Fraction The commincludes to Fraction Fraction Fraction	n of spa n of spa munity so boilers, h n of hea n of con n of tota	ace heat ace heat theme may eat pumps at from Conmunity all space	from ser from con y obtain he s, geothern commun heat from heat from	nting, spacondary, mmunity eat from se mal and wa ity CHP m heat s	ace coolings of the cooling of the c	ng or wanentary I 1 - (30° ces. The prom power	ater hear neating (1) = procedure r stations.	(Table 11	1) '0' if n CHP and	one up to four d	other heat	sources; th	1 e latter 0.13 0.87	(302) (303a) (303b)
Fraction The comminctudes be Fraction Fraction Fraction Fraction	n of spa n of spa munity so poilers, h n of hea n of con n of tota n of tota	ace heat ace heat theme may eat pumps at from C nmunity al space	from ser from co obtain he s, geotherr commun heat from heat from	nting, spacondary, mmunity eat from se mal and we ity CHP m heat s m Comn m comm	ace coolider of system system source 2 cource 2 country he	ng or wanentary I 1 - (30° ces. The prom power HP at source	ater hear neating (1) = procedure r stations.	(Table 11	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13	(302) (303a) (303b) (304a)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction	n of spa munity so poilers, h n of hea n of con n of tota n of tota or cont	ace heat ace heat theme may eat pumps at from C nmunity al space al space rol and c	from ser from co or obtain he s, geotherr commun heat from heat from heat from charging	nting, spacondary, mmunity eat from se mal and we ity CHP m heat s m Comn m comm	ace coolider of system system steem ource 2 nunity Claunity he (Table 4	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87	(302) (303a) (303b) (304a) (304b)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction	n of spa munity so poilers, h n of hea n of con n of tota n of tota or cont tion los	ace heat ace heat whene may eat pumps at from Conmunity all space all space rol and constant of the factor	from ser from co or obtain he s, geotherr commun heat from heat from heat from charging	nting, spacondary, mmunity eat from semal and we ity CHP m heat semal comments of the comments	ace coolider of system system steem ource 2 nunity Claunity he (Table 4	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87 1	(302) (303a) (303b) (304a) (304b) (305) (306)
Fraction The comminctudes be Fraction Fraction Fraction Fraction Fraction Fraction Fraction Fraction Fraction	n of spa n of spa nunity so poilers, h n of hea n of con n of tota n of tota or cont tion los heating	ace heat ace	from ser from con y obtain he s, geothern commun heat from heat from heat from charging (Table 1	nting, spacondary, mmunity eat from semal and waity CHP m heat sem Commer comme	ace coolider of system system steem ource 2 nunity Claunity he (Table 4	ng or wanentary I 1 - (30° ces. The prom power HP at source 4c(3)) fo	ater hear neating (1) = procedure r stations.	(Table 11 allows for the See Apper	1) '0' if n CHP and i	one up to four ((3)	other heat 02) x (303)	sources; th	1 e latter 0.13 0.87 0.13 0.87 1 1.05	(302) (303a) (303b) (304a) (304b) (305) (306)

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1718.24	(307b)
Efficiency of secondary/supplementary heating	g system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/su	pplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2063.55	7
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	281.67	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =	41.42	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling system	m, if not enter 0)	= (107) ÷ (314) =	12.33	(315)
Electricity for pumps and fans within dwelling (mechanical ventilation - balanced, extract or personal content of the content		9	158.57	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix L)			325.25	(332)
Electricity generated by PVs (Appendix M) (ne	gative quantity)		-158.19	(333)
Electricity generated by wind turbine (Appendit	x M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Appendix 10b. Fuel costs – Community heating scheme	,, ,		0	(334)
	,, ,	Fuel Price (Table 12)	Fuel Cost £/year	(334)
	Fuel		Fuel Cost	(334) (340a)
10b. Fuel costs – Community heating scheme	Fuel kWh/year	(Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scheme	Fuel kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85	(340a) (340b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85 8.37	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85 8.37	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = Fuel Price 13.19 x 0.01 =	Fuel Cost £/year 7.63 72.85 8.37 79.93	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85 8.37 79.93 1.63 20.92 42.9	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85 8.37 79.93 1.63 20.92	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.63 72.85 8.37 79.93 1.63 20.92 42.9	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 4.24 2.97 4.24 * 0.01 = 4.24 * 0.01 = Fuel Price 13.19 * 0.01 = 13.19 * 0.01 =	Fuel Cost £/year 7.63 72.85 8.37 79.93 1.63 20.92 42.9 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 12) 2.97 4.24 2.97 4.24 2.97 4.24 * 0.01 = 4.24 * 0.01 = Fuel Price 13.19 * 0.01 = 13.19 * 0.01 =	Fuel Cost £/year 7.63 72.85 8.37 79.93 1.63 20.92 42.9 120 -20.87	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0)] =		1.18	(357)
SAP rating (section12)				83.6	(358)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	407.54 ×	0.22	88.03	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	124.71 ×	0.52	-64.72	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	[(307b))+(310b)] x 100 ÷ (367b) x	0.22	804.87	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 21.5	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	2)	875.24	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantar	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		875.24	(376)
CO2 associated with space cooling	J	(315) x	0.52	6.4	(377)
CO2 associated with electricity for	pumps and fans within dwe	lling (331)) x	0.52	82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	168.8	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applic	cable	0.52 x 0.01 =	-82.1	(380)
Total CO2, kg/year	sum of (376)(382) =			1050.64	(383)
Dwelling CO2 Emission Rate	te (383) ÷ (4) =			14.19	(384)
El rating (section 14)				88.18	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit		_		63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	$(307a) \times 100 \div (362) =$	407.54 ×	1.22	497.2	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	124.71 ×	3.07	-382.85	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	1.22	545.46	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	3.07	-420.02	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	4546.04	(368)
Electrical energy for heat distribution	on	[(313) x		127.15	(372)

Total Energy associated with community systems	(363)(366)	+ (368)(372)	1	=	4912.98	(373)
if it is negative set (373) to zero (unless specified other	rwise, see C7 in A	ppendix C)			4912.98	(373)
Energy associated with space heating (secondary)	(309) x		0	=	0	(374)
Energy associated with water from immersion heater or i	nstantaneous hea	ter(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374)	+ (375) =			4912.98	(376)
Energy associated with space cooling	(315) x		3.07	=	37.86	(377)
Energy associated with electricity for pumps and fans with	thin dwelling	(331)) x	3.07	=	486.81	(378)
Energy associated with electricity for lighting	(332))) x		3.07	=	998.51	(379)
Energy saving/generation technologies				04 🗀		1
Item 1		;	3.07 × 0.0	01 =	-485.65	(380)
Total Primary Energy, kWh/year sum of	of (376)(382) =				5950.52	(383)

			llser F	Details:						
Assessor Name:	Chris Hockne		_ 		a Num	hor		STDO	016363	
Software Name:	Stroma FSAF	· 			a Num are Vei				on: 1.0.4.10	
			roperty	Address						
Address :										
1. Overall dwelling dime	ensions:									
Decement				a(m²)	l., .		ight(m)	1 _(0,)	Volume(m³	_
Basement				76.06	(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1r	n)	76.06	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	r
Number of chimneys	0	+ 0	+	0	= [0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	+	0	= [0	x 2	20 =	0	(6b)
Number of intermittent fa	ans					0	x '	10 =	0	(7a)
Number of passive vents	S				F	0	x -	10 =	0	(7b)
Number of flueless gas f	ires				F	0	X	40 =	0	(7c)
3					L					(, ,
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fans	s = (6a) + (6b) + (7a)	7a)+(7b)+	(7c) =	Γ	0		÷ (5) =	0	(8)
If a pressurisation test has l		intended, procee	d to (17),	otherwise (continue fr	om (9) to ((16)			_
Number of storeys in t	he dwelling (ns)						r(0)	41.04	0	(9)
Additional infiltration Structural infiltration: 0) 25 for stool or tir	nhar frama ar	· 0 25 fo	r macani	rv constr	ruction	[(9)	-1]x0.1 =	0	(10)
if both types of wall are p					•	uction			0	(11)
deducting areas of openi	ings); if equal user 0.3	5	J		,					_
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	•								0	(13)
Percentage of window Window infiltration	s and doors drau	gnt strippea		0.25 - [0.2) v (14) ± 1	1001 -			0	(14)
Infiltration rate				-	. ,	12) + (13) -	+ (15) =		0	(15)
Air permeability value,	a50. expressed i	n cubic metre	es per ho					area	3	(17)
If based on air permeabi	•		•	•	•				0.15	(18)
Air permeability value applie						is being u	sed			
Number of sides sheltered	ed			(00)	TO 075 (4	10)1			3	(19)
Shelter factor					[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorpora	-			(21) = (18) X (20) =				0.12	(21)
Infiltration rate modified		 	1	1 1	Con	Oct	Nov	Doo	1	
Jan Feb		May Jun ,	Jul	Aug	Sep	Oct	Nov	Dec	J	
Monthly average wind sp (22)m= 5.1 5		4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(22)111= 3.1 3	4.4	3.0] 3.6	3.1	<u> </u>	4.3	4.0	4.7	J	
Wind Factor $(22a)m = (2a)m =$	2)m ÷ 4								_	
(22a)m= 1.27 1.25	1.23 1.1 1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

· —	ation rate (`		1	т —	i ´	r` ´	ì		0.40	T 0.44		
0.15 Calculate effec		0.14 anae	0.13 rate for t	0.12 he appli	0.11 icable ca	0.11 se	0.11	0.12	0.12	0.13	0.14		
If mechanica		_									ſ	0.5	(2
If exhaust air he	eat pump usi	ng Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	o) = (23a)		[0.5	(2:
If balanced with	heat recove	ry: effic	eiency in %	allowing	for in-use f	actor (fron	n Table 4h) =			[76.5	(2:
a) If balance	d mechan	ical ve	entilation	with he	at recov	ery (MV	HR) (24a	a)m = (2)	2b)m + (23b) × [1 - (23c)	÷ 100]	
24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
b) If balance	d mechan	ical ve	entilation	without	heat red	covery (N	MV) (24b	m = (22)	2b)m + (2	23b)			
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h	ouse extra n < 0.5 × (2			•	•				.5 × (23b)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)n	ventilation n = 1, then								0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change ra	te - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)					
25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2
3. Heat losse	s and heat	loss	paramet	er:									
LEMENT	Gross area (n	∩²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	≺)	k-value kJ/m²·k		A X k kJ/K
oors					2.6	X	1.2	=	3.12				(2
lindows Type	: 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(2
Vindows Type	2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(2
Vindows Type	3				5.51	_x 1	/[1/(1.2)+	0.04] =	6.31				(2
Vindows Type	4				0.65	x1	/[1/(1.2)+	0.04] =	0.74				(2
loor					14.36	3 X	0.11	=	1.5796				(2
Valls Type1	38.14		20.5	В	17.56	6 X	0.15	=	2.63				(2
Valls Type2	23.92		2.6		21.32	2 x	0.15	=	3.2				(2
Valls Type3	5.95		0		5.95	X	0.15	=	0.89				(2
Valls Type4	29.51		0		29.5	1 ×	0.15	=	4.43	Ī			(2
otal area of e	lements, n	n²			111.8	8							(3
arty wall					12.35	5 X	0	=	0			7 [(3
arty floor					61.7	一						7 =	(3
arty ceiling					76.06	<u> </u>				j		ī	(3
for windows and * include the area						ated using	g formula 1	/[(1/U-valu	ue)+0.04] a	ıs given in	paragraph	3.2	
abric heat los	s, $W/K = S$	S (A x	U)				(26)(30)) + (32) =				39.42	(3
leat capacity	Cm = S(A)	xk)						((28).	(30) + (32	2) + (32a).	(32e) =	27990.	6 (3

		.		ulation.										_
	Ū	•	,		using Ap	•	K						18.24	(36
	of therma abric hea		are not kn	own (36) =	= 0.15 x (3	11)			(33) +	(36) =			57.66	(37
			alculated	l monthly	V						25)m x (5)		37.00	(0.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat tr	ansfer c	oefficier	nt W/K		ļ	<u> </u>	<u>!</u>	ļ	(39)m	= (37) + (37)		<u>I</u>		
9)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24		
					<u> </u>	<u> </u>			,	Average =	Sum(39) ₁ .	12 /12=	73.62	(3
eat Ic	ss para	meter (F	HLP), W	m²K					(40)m	= (39)m ÷	(4)	•	1	
0)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		<u> </u>
ımbe	er of day	rs in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.97	(4
311100	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
,							ļ	ļ					I	
\/\/s	ter heat	ing ener	gy requi	rement:								kWh/y	aar:	
. ,,	itor ricat	ing chici	gy roqui	TOTTION.								IXVVII/ y	Jai.	
		pancy, I						\ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \		10		38		(
			+ 1.76 x	[1 - exp	(-0.0003	349 x (TI	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
ı+ I L	V T. 1.7 (
	A £ 13.9 Laverag	•	ater usac	ne in litre	es per da	av Vd av	erage =	(25 x N)	+ 36		90	82		(
nua _{duce}	averag	e hot wa al average	hot water	usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.82]	(
nua _{duce}	averag	e hot wa al average	hot water	usage by		lwelling is	designed			se target o		.82		(
nnua duce t more	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed i	Aug		se target o Oct		.82 Dec]	(
nnua duce t more	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed i	Aug	a water us	_	<i>-</i>	<u> </u>		(
nnua duce t more t wate	averag the annua that 125 Jan	e hot wa al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed i	Aug	a water us	_	<i>-</i>	<u> </u>		
nnua duce t more t wate	averag the annua that 125 Jan er usage ir	e hot wa al average litres per p Feb n litres per 96.27	hot water person per Mar day for ea	usage by day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 85.37	Jun ctor from 3	designed and all displayed by the second sec	Aug (43) 85.37	Sep	Oct 92.63 Fotal = Su	Nov 96.27 m(44) ₁₁₂ =	Dec 99.9	1089.8	
inua duce t more t wate)m= ergy o	averag the annual that 125 Jan er usage ir 99.9	e hot wa al average litres per p Feb n litres per 96.27	Mar day for ea 92.63 used - cal	Apr ach month 89	5% if the orater use, I May $Vd,m = fa$ 85.37 $conthly = 4$	Jun ctor from 1 81.73	designed and desig	Aug (43) 85.37	Sep 89	Oct 92.63 Total = Su th (see Ta	96.27 m(44) ₁₁₂ = ables 1b, 1	99.9 c, 1d)	1089.8	
nnua duce t more t wate)m= ergy o	averag the annua that 125 Jan er usage ir	e hot wa al average litres per p Feb n litres per 96.27	hot water person per Mar day for ea	usage by day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 85.37	Jun ctor from 3	designed and all displayed by the second sec	Aug (43) 85.37	Sep 89 6 kWh/more 103.86	92.63 Fotal = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
nnua educe t more et wate l)m= ergy (Jan 99.9 content of	Feb n litres per 96.27 hot water	Mar day for ea 92.63 used - cale	Apr ach month 89 culated mo	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4.	Jun ctor from 1 81.73 190 x Vd,r	Jul Table 1c x 81.73 m x nm x E 89.44	Aug (43) 85.37	Sep 89 6 kWh/more	92.63 Fotal = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1	99.9 c, 1d)	1089.8	((
nnua duce t more t t wate t wate m= ergy o	Jan 99.9 content of	Feb n litres per 96.27 hot water	Mar day for ea 92.63 used - cale	Apr ach month 89 culated mo	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4.	Jun ctor from 1 81.73 190 x Vd,r	Jul Table 1c x 81.73 m x nm x E 89.44	Aug (43) 85.37 07m / 3600 102.63	Sep 89 6 kWh/more	92.63 Fotal = Su 121.03	96.27 m(44) ₁₁₂ = ables 1b, 1 132.12	99.9 c, 1d)		
nnua duce t more t t wate t wate mergy (i)m= mstant	Jan er usage ir 99.9 content of	Feb plitres per per per per per per per per per per	Mar day for ea 92.63 used - cale 133.7	Apr ach month 89 culated mo 116.57	5% if the covater use, I May Vd,m = fa 85.37 onthly = 4. 111.85	Jun ctor from 8 81.73 190 x Vd,r 96.52	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in	Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	89 89 103.86 1 to (61)	Oct 92.63 Total = Su 121.03 Total = Su	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	99.9 = c, 1d) 143.47		
nua duce t more t water)m= ergy (nstant	Jan 99.9 content of 148.15 daneous w 22.22 storage	Feb litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06	Apr ach month 89 culated mo 116.57 of use (no	5% if the orater use, I May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage),	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42	Aug (43) 85.37 DTm / 3600 102.63 boxes (46)	Sep 89 103.86 1 to (61) 15.58	Oct 92.63 Total = Su 121.03 Total = Su 18.16	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	99.9 = c, 1d) 143.47		
nnua duce t more t wate t wate nstant nm= ater corag	average the annual enthat 125 Jan 99.9 content of 148.15 anneous w 22.22 storage e volum munity h	Feb Per per per per per per per per per per p	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage litres in	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t wate ergy (in)m= nstant ater orag herw	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h	Feb n litres per 96.27 hot water 129.57 rater heatin 19.44 loss: e (litres) eating a p stored	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun ctor from 7 81.73 190 x Vd,r 96.52 r storage), 14.48	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage litres in	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa	Sep 89 103.86 15.58 ame vess	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t)m= ergy (in)m= nstant orag comr herw ater	Jan 99.9 content of 148.15 staneous w 22.22 storage e volum munity h vise if no	Feb n litres per per per per per per per per per per	Mar day for ea 92.63 used - call 133.7 ng at point 20.06 includin nd no ta hot water	Apr ach month 89 116.57 of use (not) 17.48 ag any so ank in dwer (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ =	Dec 99.9 = c, 1d) 143.47 = 21.52		(
nnua duce t more t wate t wate ergy (initial)m= astani astar orag common herw ater of f m	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no	Feb n litres per 96.27 hot water 129.57 rater heatin 19.44 loss: e (litres) eating a o stored loss: urer's de	Mar day for ea 92.63 used - calc 133.7 ag at point 20.06 includin nd no talc hot water eclared leaders on per per per per per per per per per per	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw er (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W yelling, e	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous co	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vess	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua duce t more t wate t)m= ergy t si)m= ater orag comr herw ater t) If m	average the annual e that 125 Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufaction	Feb litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot wate eclared le	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i	Jun startar 110 nstantar	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		
nnua educe t more t wate t more for wate t more for wate t more for more fo	Jan er usage ir 99.9 content of 148.15 daneous w 22.22 storage e volum munity h vise if no storage rature fa r lost fro	Feb n litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includin nd no ta hot water	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so nk in dw er (this in oss facto 2b , kWh/ye	5% if the orater use, I May $Vd,m = fa$ 85.37 $0nthly = 4$. 111.85 $0 hot water$ 16.78 polar or W $velling, e$ $orater use, I$	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar	designed and desig	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47)	Sep 89 103.86 15.58 ame vessers) enter	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		(
nnua educe t more t wate t more t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t more t wate t wa	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufact rature fa	Feb n litres per per per per per per per per per per	Mar day for ear 92.63 used - call 133.7 ag at point 20.06 including and no tall hot water eclared less storage eclared of the colored of t	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82	Dec 99.9 = c, 1d) 143.47 = 21.52		(.) (.) (.) (.) (.)
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nnua educe t more of wate thorward nstant orag committer cater orag committer interv orag interv orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag committer orag orag	Jan 99.9 content of 148.15 aneous w 22.22 storage e volum munity h vise if no storage anufacti rature fa v lost fro anufacti ter stora munity h e factor	Feb of litres per per per per per per per per per per	Mar day for ea 92.63 used - calc 133.7 ng at point 20.06 includir nd no ta hot water eclared le storage eclared of	Apr ach month 89 culated mo 116.57 of use (no 17.48 ag any so ank in dw er (this in cylinder I com Tabl on 4.3	May Vd,m = fa 85.37 onthly = 4. 111.85 o hot water 16.78 olar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 181.73 190 x Vd,r 96.52 r storage), 14.48 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.73 m x nm x E 89.44 enter 0 in 13.42 storage 0 litres in neous con/day):	Aug (43) 85.37 07m / 3600 102.63 boxes (46) 15.39 within sa (47) ombi boil	Sep 89 103.86 15.58 ame vessers) enter	Oct 92.63 Total = Su 121.03 Total = Su 18.16 sel	Nov 96.27 m(44) ₁₁₂ = ables 1b, 1 132.12 m(45) ₁₁₂ = 19.82 47)	Dec 99.9 = c, 1d) 143.47 = 21.52 0		(44 (44 (44 (44 (45) (45) (45)

Chargy lost from water	r otorogo	Id Mile /s d	205			(47) v (E4)) v (EQ) v (I	E0)			1	(5.4)
Energy lost from wate Enter (50) or (54) in ((47) X (51)) x (52) x (53) =		.03		(54) (55)			
Water storage loss ca	,	or each	month			((56)m = ((55) × (41)r	m	1.	.03		(55)
	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
(56)m= 32.01 28.92 If cylinder contains dedicate											 ix H	(30)
(57)m= 32.01 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
` '		T 11							ļ	<u> </u>		(58)
Primary circuit loss (as Primary circuit loss ca	,			50\m - i	(58) <u>+</u> 36	S5 ~ (/11)	ım			0		(30)
(modified by factor f			`	,	` '	` '		r thermo	stat)			
(59)m= 23.26 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m			ı		l	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required for	r water he	eating ca	alculated	l for eac	h month	(62)m =	: 0.85 × (′45)m +	 (46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input calculated	l using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	l	
(add additional lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water hea	ater				!		•			•	•	
(64)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
						Outp	out from wa	ater heate	r (annual)₁	12	2079.74	(64)
Heat gains from water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	nl + 0.8 x	(146)m	+ (57)m	+ (59)m	1	_
						. (.)	.,	ι (. Ο /	. (0.)	()	1	
(65)m= 93.48 83.02	88.68	81.55	81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93	1	(65)
(65)m= 93.48 83.02 include (57)m in cal				<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
	culation o	of (65)m	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see	culation of	of (65)m and 5a	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal	culation of	of (65)m and 5a	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table	culation of the Table 5	of (65)m and 5a	only if c	ylinder i	73.96 s in the o	78.35 dwelling	77.33 or hot w	84.47 ater is fr	86.72 rom com	91.93 munity h		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb	culation of Earth Culation of	of (65)m and 5a ts Apr 143.03	only if c : May 143.03	Jun 143.03	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03	culation of Earth Culation of	of (65)m and 5a ts Apr 143.03	only if c : May 143.03	Jun 143.03	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate)	e Table 5 e 5), Wat Mar 143.03 ated in Ap	of (65)m and 5a ts Apr 143.03 ependix 25.72	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on	Jun 143.03 ion L9 o	73.96 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculated) (67)m= 47.03 41.77	e Table 5 e 5), Wat Mar 143.03 ated in Ap	of (65)m and 5a ts Apr 143.03 ependix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	73.96 s in the o Jul 143.03 r L9a), a 17.54	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate)	culation of the culture of the cultu	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if c May 143.03 L, equati 19.22 dix L, eq 270.31	Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is from Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21	culation of the culture of the cultu	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if c May 143.03 L, equati 19.22 dix L, eq 270.31	Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is from Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69	culation of the culation of th	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula	culation of the culation of th	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains	culation of the culation of th	of (65)m and 5a ts Apr 143.03 ependix 25.72 Appendix 292.44 ependix 51.69 5a) 0	only if constructions only its constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a; 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0	culation of the culation of th	of (65)m and 5a ts Apr 143.03 ependix 25.72 Appendix 292.44 ependix 51.69 5a) 0	only if constructions only its constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a; 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation	culation of the culation of th	of (65)m ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 0 see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 om com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation (71)m= -95.35 -95.35	culation of the culation of th	of (65)m ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 0 see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 om com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatic (71)m= -95.35 -95.35 Water heating gains (culation of the English Coulation of the English Coulation of the English Coulated in Application Appl	of (65)m and 5a ts Apr 143.03 ependix 25.72 Append 292.44 ependix 51.69 6a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table 51.69 0	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains ((72)m= 125.65 123.55	culation of the English Coulation of the English Coulation of the English Coulated in Application Appl	of (65)m and 5a ts Apr 143.03 ependix 25.72 Append 292.44 ependix 51.69 6a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains ((72)m= 125.65 123.55 Total internal gains =	culation of the cultivation of t	of (65)m and 5a ts Apr 143.03 ppendix 25.72 Appendix 51.69 5a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69 0 lle 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0 -95.35	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 0 -95.35	84.47 ater is from the second of the second	86.72 rom com Nov 143.03 45.34 280.24 51.69 0 -95.35 120.45 1)m + (72)	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79]	0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

Southwest	0	x	0.6	S5	X	10	04.39			0.24	×	0.7	=	7.9	(79)
Southwest	0.9x 0.77	X	5.5	51	X	9	2.85			0.24	x	0.7		59.56	(79)
Southwest	0.9x 0.77	x	0.6	35	X	9	2.85]		0.24	x [0.7		7.03	(79)
Southwest	0.9x 0.77	x	5.5	51	X	6	9.27]		0.24	x [0.7		44.43	(79)
Southwest	0.9x 0.77	x	0.6	S5	x	6	9.27]		0.24	x [0.7	=	5.24	(79)
Southwest	0.9x 0.77	x	5.5	51	x	4	4.07			0.24	x [0.7		28.27	(79)
Southwest	0.9x 0.77	x	0.6	35	x	4	4.07			0.24	x [0.7	=	3.34	(79)
Southwest	0.9x 0.77	x	5.5	51	x	3	1.49] [0.24	x	0.7		20.2	(79)
Southwest	0.9x 0.77	x	0.6	35	x	3	1.49			0.24	x	0.7		2.38	(79)
					•									•	
Solar gain	s in watts, c	alculated	I for eac	h month				(83)m	ı = Sı	ım(74)m .	(82)m			_	
(83)m= 45	5.33 83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gain	s – internal a	and solar	· (84)m =	= (73)m	+ (8	33)m	, watts					-		_	
(84)m= 63	2.31 666.4	693.47	721.08	737.03	71	17.34	686.56	656	6.6	629.18	606.65	600.84	610.35	5	(84)
7. Mean	internal temp	perature	(heating	season)										
	ture during h		, ,		<i>'</i>	area f	from Tab	ole 9,	, Th′	1 (°C)				21	(85)
•	n factor for g	• .			-					` ,					
	Jan Feb	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	:	
(86)m= 0	.99 0.98	0.97	0.93	0.82	(0.63	0.46	0.5	5	0.74	0.93	0.98	0.99	7	(86)
— Mean int	ernal tempe	rature in	living ar	aa T1 (fo	الد	w sta	ns 3 to 7	7 in T	ahle	9c)					
	0.2 20.3	20.48	20.71	20.9	_	0.98	21	2	$\overline{}$	20.96	20.75	20.44	20.18	\neg	(87)
	<u> </u>	<u> </u>		l				l				1		_	, ,
· —	ture during h	20.1	eriods ir 20.11	20.11	_	elling 0.12	20.12	20.		20.12	20.11	20.11	20.1	¬	(88)
(88)m= 20	0.09 20.1	20.1	20.11	20.11		0.12	20.12	20.	12	20.12	20.11	20.11	20.1		(00)
	n factor for g	1			_	·		É						_	
(89)m = 0	.99 0.98	0.96	0.9	0.77	().55	0.37	0.4	11	0.67	0.91	0.97	0.99		(89)
Mean int	ernal tempei	rature in	the rest	of dwell	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)			_	
(90)m= 19	9.05 19.19	19.45	19.78	20.02	2	0.11	20.12	20.	12	20.08	19.83	19.41	19.03		(90)
										f	LA = Livi	ng area ÷ (4) =	0.26	(91)
Mean int	ernal tempei	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 19	9.34 19.48	19.71	20.02	20.24	2	0.33	20.35	20.	35	20.31	20.07	19.67	19.32	7	(92)
Apply ad	justment to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate	<u>.</u> !			
(93)m= 19	9.34 19.48	19.71	20.02	20.24	2	0.33	20.35	20.	35	20.31	20.07	19.67	19.32		(93)
8. Space	heating req	uirement													
	the mean in		•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
	ation factor fo			1			l	г.	1	_ 1		T	г_	¬	
	Jan Feb	Mar	Apr	May	<u></u>	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	<u>:</u>	
	n factor for g	0.96	0.9	0.78		0.57	0.39	0.4	12	0.69	0.9	0.97	0.99	7	(94)
` ′		l		<u> </u>).57	0.39	0.4	13	0.09	0.9	0.97	0.99		(34)
	ains, hmGm 1.82 650.21	663.11	649.75	572.29	40	08.52	270.92	284	23	431.77	548.6	582.65	601.8	٦	(95)
` ′	average exte			l .	<u> </u>		1 2.0.02	1 204	[.01.77	3-10.0	1 302.00	1 301.0		(30)
	4.3 4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	٦	(96)
· · ·	s rate for me	ļ		<u> </u>				ļ				1	L	_	` '
	28.3 1090.51	985.89	819.34	627.57	_	15.88	271.64	285	' T	452.57	695.54	928.43	1122.5	7	(97)
` / · ·	1			L			L					1			. ,

Space heating requirement in kWh/m²/year Sum/99)	Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
Space heating requirement in kWh/m²/year Space S	(98)m= 376.82	295.88	240.15	122.1	41.13	0	0	0	0	109.32	248.96	387.45		
Second S								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	1821.82	(98)
Calculated for June, July and August. See Table 10b. Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 0 0 0 0 0 0.85 158.75 58.81 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Space heating	g require	ement in	kWh/m²	²/year								23.95	(99)
San Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hollowing Sep Cat Nov Dec Hollowing Sep Sep Cat Nov Dec Hollowing Sep	8c. Space co	oling red	quiremen	nt								_		<u> </u>
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10 (100)m	Calculated fo	r June, c	July and	August.	See Tal	ole 10b	,				,	•		
(100)m=		<u> </u>				L		<u> </u>	<u> </u>	L				
Utilisation factor for loss hm						·	i	1				$\overline{}$		(100)
(101)	,			U		001.01	530.74	549.61	U	U	0	0		(100)
Useful loss, hmLm (Watts) = (100)m x (101)m		1		0	0	0.9	0.95	0.93	0	0	0	0		(101)
(102)m=	` '	ımLm (V			(101)m	<u> </u>	<u> </u>							, ,
(103)m=		- `			`	r	509.45	512.46	0	0	0	0		(102)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m (104)m	Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)					
Set (104)m to zero if (104)m < 3 × (98)m	(/			_					l					(103)
Cooled fraction Total = Sum(10.4) = 400.08 (104) (105) (105) (106)m= 0 0 0 0 0 0 0 0 0	•	•				dwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
Total = Sum(104) = 400.08 (104)	`	1		· `	i –	106.88	161.24	131.96	0	0	0	0		
Cooled fraction f C = cooled area ÷ (4) =							<u> </u>		Total	= Sum(104)	└	400.08	(104)
Closim	Cooled fractio	n								,	,	4) =	0.59	(105)
Total = Sum(104) = 0 (106) Space cooling requirement for month = (104)m × (105) × (106)m		<u> </u>							·	·				
Space cooling requirement for month = (104)m × (105) × (106)m (107)m =	(106)m= 0	0	0	0	0	0.25	0.25	0.25	l	l	l	<u> </u>		7
Total = Sum(107) = 0 0 0 0 0 15.63 23.58 19.3 0 0 0 0 0 0 Total = Sum(107) = 58.52 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.77 (108) 9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 – (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) x (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (305b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (305b) Fraction of total space heat from community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement	Space cooling	requirer	ment for	month -	· (104)m	× (105)	✓ (106)r	m	I ota	I = Sum(104)	= [0	(106)
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.77 (108) 9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 – (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 0.13 (303a) Fraction of total space heat from Community CHP (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fractor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement 1821.82	· —	 			`		_ `		0	0	0	0		
9b. Energy requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 — (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 0.13 (303a) Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system 1 (305) Space heating Annual space heating requirement			ļ.		ļ.	ļ.	ļ.		Tota	= Sum(107)	=	58.52	(107)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none [Incomparison of space heat from secondary/supplementary heating (Table 11) '0' if none [Incomparison of space heat from community system 1 – (301) = Incomparison of space heat from community system 1 – (301) = Incomparison of space heat from community system 1 – (301) = Incomparison of space heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP [Incomparison of community heat from heat source 2 Incomparison of total space heat from Community CHP [Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat source 2 Incomparison of total space heat from community heat from power stations. See Appendix C. Incomparison of total space heat from community heat from power stations. See Appendix C. Incomparison of total space heat from community heat fr	Space cooling	requirer	ment in k	:Wh/m²/	year				(107)) ÷ (4) =		Ī	0.77	(108)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 1 (302)	9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme	;					L		
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Community heat from heat source 2 Community heat from Community CHP Community heat from Community CHP Community heat from Community CHP Community heat from Community CHP Community heat from Community heat source 2 Community heat from Community heat source 2 Community heat from Community heat source 2 Community heat from Community heating system Community heati											unity sch	neme.		_
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from Community heat source 2 Fraction of total space heat from	Fraction of spa	ace heat	from se	condary	/supplen	nentary I	heating	(Table 1	1) '0' if n	one			0	(301)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Annual space heating requirement O.13 (303a) (304a) (302) × (303b) = (302) × (303b) = (305) (306)	Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 0.13 (303a) (303b) = 0.13 (304a) (304a) (302) × (303b) = (305) (306) (306) (306) (307) (308) (308) (309) (30										up to four	other heat	sources; th	e latter	
Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1.05 (306)			•		aste neat t	rom powei	r stations.	See Appei	naix C.			Γ	0.13	(303a
Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement (302) × (303a) = 0.13 (304a) (302) × (303b) = 0.87 (305) (305) (305) (306)				,	source 2							L		╡`
Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1821.82		•								(0	00) (000	_\ [=
Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement 1821.82		•			•					•	, ,	Ĺ	0.13	╡`
Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement 1.05 (306) KWh/year 1821.82	Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Space heating Annual space heating requirement kWh/year 1821.82	Factor for con	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Annual space heating requirement 1821.82	Distribution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m				Γ	1.05	(306)
	Space heatin	g										_	kWh/yea	r
Space heat from Community CHP (98) x (304a) x (305) x (306) = 248.68 (307a)	Annual space	heating	requirem	nent									1821.82	
	Space heat fro	om Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306) :	-	248.68	(307a)

				_
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1664.23	(307b)
Efficiency of secondary/supplementary heati	ng system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/s	supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2079.74	7
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	202.00	一 (310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	283.88 1899.84	(310a) (310b)
Electricity used for heat distribution	0.0	11 × [(307a)(307e) + (310a)(310e)] =		(313)
·	0.0	(310a)(310e)] =	40.97	Ⅎ`
Cooling System Energy Efficiency Ratio	iom if not ontor (1)	(407) - (244)	4.73	(314)
Space cooling (if there is a fixed cooling syst	•	= (107) ÷ (314) =	12.38	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or	,	Э	162.85	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Appendix L)		332.22	(332)
Electricity generated by PVs (Appendix M) (r	negative quantity)		-162.5	(333)
Electricity generated by wind turbine (Appen	dix M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Appen 10b. Fuel costs – Community heating schero	, , , , , , , , , , , , , , , , , , , ,		0	(334)
, , , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , , ,	Fuel Price (Table 12)	Fuel Cost £/year	(334)
, , , , , , , , , , , , , , , , , , , ,	me Fuel		Fuel Cost	(334) (340a)
10b. Fuel costs – Community heating scher	Fuel kWh/year	(Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scher	Fuel kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scher Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	(Table 12) 2.97 x 0.01 = 4.24 x 0.01 =	Fuel Cost £/year 7.39 70.56	(340a) (340b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (315b) (331)	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43 80.55	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43 80.55	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (315b) (331)	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43 80.55 1.63 21.48	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (315b) (331)	(Table 12) 2.97	Fuel Cost £/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (315b) (331)	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = 13.19 x 0.01 = 13.19 x 0.01 = 13.19 x 0.01 =	Fuel Cost £/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = 13.19 x 0.01 = 13.19 x 0.01 = 13.19 x 0.01 =	Fuel Cost £/year 7.39 70.56 8.43 80.55 1.63 21.48 43.82 120 -21.43	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0]=		1.15	(357)
SAP rating (section12)				83.91	(358)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	394.73 ×	0.22	85.26	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	120.79 ×	0.52	-62.69	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP usin	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	[(307b)	+(310b)] x 100 ÷ (367b) x	0.22	= 796.11	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 21.26	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	72)	= 865.71	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantan	eous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		865.71	(376)
CO2 associated with space cooling	J	(315) x	0.52	= 6.43	(377)
CO2 associated with electricity for	pumps and fans within dwel	ling (331)) x	0.52	= 84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 172.42	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applic	cable	0.52 x 0.01 =	-84.34	(380)
Total CO2, kg/year	sum of (376)(382) =			1044.75	(383)
Dwelling CO2 Emission Ra	te $(383) \div (4) =$			13.74	(384)
El rating (section 14)				88.44	(385)
13b. Primary Energy – Community	heating scheme				7
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit		-	Duite a second	63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	_
Space heating from CHP)	$(307a) \times 100 \div (362) =$	394.73 ×	1.22	481.57	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	120.79 ×	3.07	-370.81	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	1.22	549.74	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 X	3.07	-423.31	(366)
Efficiency of heat source 2 (%)	If there is CHP using	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	= 4496.56	(368)
Electrical energy for heat distribution	on	[(313) x		125.77	(372)

Total Energy associated with community systems	(363)(366) + (368)(372))	=	4859.51	(373)
if it is negative set (373) to zero (unless specified otherwise	e, see C7 in Appendix C))		4859.51	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or install	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			4859.51	(376)
Energy associated with space cooling	(315) x	3.07	=	38.02	(377)
Energy associated with electricity for pumps and fans within o	dwelling (331)) x	3.07	=	499.96	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1019.91	(379)
Energy saving/generation technologies			_		,
Item 1		3.07 × 0.0°	=	-498.87	(380)
Total Primary Energy, kWh/year sum of (376	5)(382) =			5918.53	(383)

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa				Versio	n: 1.0.4.10	
	F	Property	Address	Flat 2-	1-Green				
Address: 1. Overall dwelling dime	ensions:								
1. Overall awelling aime	,	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) ====	74.06	(4)			-		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins			Ī	0	x ′	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_			A in a b	ongoo nor he	
	, o flues and force (60) (6b) (70) . (7 b)	(70) -	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		(//				,		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wan are	a (anter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2	v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per ho					area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•				0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	ed		(20) 4	10 07E v (4	10)1			2	(19)
Shelter factor	ting chalter feater		(20) = 1 - (21) = (18)		19)] =			0.85	(20)
Infiltration rate incorpora Infiltration rate modified to	•		(21) = (10	/ X (20) =				0.13	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	1 3		1	1 -		l	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
Wind Easter (22a) == (2	2)m · 4	-			-	-		-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
(-24)	1 0.99	1 0.00	1 3.02		L	12	Lo	J	

Adjusted infiltration r	ate (allow	ing for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective a	•	rate for t	he appli	cable ca	se						_	
If mechanical vent		and the N. (O	10l-) (00-			NIE\\ - (l) (00-)			0.5	(23a
If exhaust air heat pur			, ,	,	. `	,, .	,	o) = (23a)			0.5	(23b
If balanced with heat re	-	-	_								76.5	(230
a) If balanced med		1	.	1	, ` ` ` 	- ^ ` -	ŕ	r ´ `		- ` `) ÷ 100] ¬	40.4
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a
b) If balanced med			ı —		, , `	, ``	í `	, 		1	٦	
(24b)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole house of if (22b)m < 0.5			•					5 v (23h	2)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0	1	(240
d) If natural ventila	tion or wh	nole hous	se positiv	ve input	ventilati	on from	loft				_	
if (22b)m = 1,			•	•				0.5]				
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(240
Effective air chang	e rate - e	nter (24a) or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and	heat loss	paramete	er.									
ELEMENT Gr	oss a (m²)	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-valu kJ/m²·		A X k kJ/K
Doors	,			2.6	x	1.2		3.12	$\stackrel{'}{\Box}$			(26)
Windows Type 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	=			(27)
Windows Type 2				3.95	〓 .	/[1/(1.2)+	· 0.04] =	4.52	=			(27)
Windows Type 3				5.51		/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type 4				0.65	〓 .	/[1/(1.2)+	· 0.04] =	0.74	=			(27)
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7.78	20.58	8	47.2	=			7.08	-		\neg	(29)
Walla Tura O	4.47	2.6		21.87		0.15		3.28	북 ¦		룩 늗	(29)
-	.93	0	_	5.93	=	0.15	-	0.89	<u>-</u>		႕	(29)
Total area of elemen					=	0.15		0.09	[
	13, 111			98.18	=							(31)
Party floor				12.38	=	0	=	0	<u> </u>		┥	(32)
Party floor				74.06	=				Ĺ		╡	(32a
Party ceiling				74.06					[(32b
* for windows and roof wi ** include the areas on bo					lated using	g formula :	/[(1/U-valu	ie)+0.04] a	as given in	n paragrapi	h 3.2	
Fabric heat loss, W/I	< = S (A x	(U)				(26)(30) + (32) =				37.93	(33)
Heat capacity Cm =	S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	27828.4	(34)
Thermal mass paran	notor (TM)	P = Cm -	- TFA) ir	n kJ/m²K			Indica	ntive Value	: Medium		250	(35)
mormar made parar	ierei (i ivii	·	,									
For design assessments can be used instead of a	where the de	etails of the	,	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
For design assessments	where the de	etails of the culation.	construct		•	recisely the	e indicative	e values of	f TMP in Ta	able 1f	11.04	(36)

Total fabric heat loss Ventilation heat loss calculated monthly Ventilation heat loss calculated monthly (38)me 337 (25)m x (5) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (38)me 37, 17.59 17.39 16.36 16.18 15.16 15.16 15.16 15.57 15.18 15.55 16.18 16.58 16.39 (38)me 36.77 36.57 36.57 36.58 56.55 66.15 64.14 64.14 36.33 64.56 66.15 65.55 65.59 Heat transfer coefficient, W/K (39)me 37, 30.57 30.50 30.30 30.30 30.80 30.80 30.87 30.80 30.8												,		_
Salar									. ,	•	,,		48.97	(37)
17.8 17.8 17.8 17.3 16.30 16.18 15.16 15.16 14.96 15.57 16.18 16.58 16.99 (38)		1		· ·	í					ı —		D	1	
Heat transfer coefficient, W/K (39)m = (877)		<u> </u>	_					Ť	<u> </u>					(38)
(39)me 66.77 66.36 66.36 66.35 65.15 64.14 64.14 63.93 64.54 65.15 65.55 65.96 Heat loss parameter (HLP), W/m²K	` /	L		10.50	10.10	10.10	10.10	14.50		<u> </u>		10.55		(55)
Average Sum(30)				65.25	65.15	64.14	64.14	62.02	· · ·	`		65.06		
Heat loss parameter (HLP), W/m²K	(39)111= 00.77	00.57	00.50	00.00	03.13	04.14	04.14	03.93					65.3	(39)
Average = Sum(40), /12	Heat loss para	ameter (H	HLP), W	m²K								.127		 ` ′
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.9	0.9	0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		_
### A. Water heating energy requirement: ### Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA = 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usage to twelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usage to twelling is designed to achieve a water use target of not more that 175 litres per person per day (alwater usa, hot and codd) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ### Journal of Nov Water usage in litres per day for each month Vd.m = factor from Table 1c x (43) ### (44)m= 98.77 95.17 91.58 87.98 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 ### Total = Sum(44). v= 1077.45 (44) ### Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables to, lt.) (dis)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 ### Total = Sum(45)v= 1412.71 (45) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): ### Outper storage loss factor from Table 2b ### Decay of the water storage instantaneous combi boilers) enter '0' in (47) ### Union Storage loss factor from Table 2b ### Decay of the water storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the storage in the sto	Number of day	ys in mo	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	.12 /12=	0.88	(40)
### Assumed occupancy, N If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N	(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
Assumed occupancy, N													•	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Assumed occi	inancy	N									24	l	(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)p = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)p = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) if manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53)				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		34		(42)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)		•	_4			\/-		(O.F N.I.)	. 00				I	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										se target o		.79		(43)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)_1_0 = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)_1_0 = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (52) Temperature factor from Table 2b (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	not more that 125	litres per p	person pei	day (all w	ater use, l	hot and co	ld)							
(44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)_1 = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(45)_1 = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b (a) (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (1.03 (52) x (53) = 1.03 (54)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Total = Sum(44)	Hot water usage i	in litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		_
Total = Sum(45) ₁₂	Energy content of	f hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			. ,		1077.45	(44)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
(46)me 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)		·								Total = Su	m(45) ₁₁₂ =		1412.71	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03		ı											I	
Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	` '		19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54)	_) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel)		(47)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54)	•	, ,		•			_							` '
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (48) (49) (49) (50) (51) (51) (52) (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (54)	Otherwise if no	o stored	hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (49) (49) (49) (49) (49) (50) (51) (51) (52) (52) (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (54)	_												ı	
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)					or is kno	wn (kVVI	n/day):)		, ,
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)	•										()		, ,
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (51) (52) (53)	• • •		-	-		or is not		(48) x (49)) =		1	10		(50)
Volume factor from Table 2a	•			-							0.	02		(51)
Temperature factor from Table 2b	•	•		on 4.3										
Energy lost from water storage, kWh/year $ (47) \times (51) \times (52) \times (53) = 1.03 $ (54)				O.b.							——			
	·							(47) (7:1)	(FC) :	5 0)	0	.6		
1.03	•		_	, KVVh/ye	ear			(47) x (51)	x (52) x (53) =				
	<u> </u>	, - , , , , (,								1.	00		(00)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•			•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			1	1	l	
· /	"=."	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraint on the constraints on the constraint on the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on t	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calculations (See Property Control of C	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraint on the constraints on the constraint on the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on t	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances ga (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction on the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction of the construction on the construction on the construction on the construction on the construction on the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculati	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. e	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (Table Feb 140.43 s (calculations (calculations) 11.53 s (calculations) 11.53 s (calculations) 151.38 s (calc	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial from the second seco	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. etc. (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculations (Calculations) (Calc	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ble 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	х	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

											_					_
Southwest _{0.9}	0	x	0.6	S5	X	10	04.39			0.24	X	0.7	=		7.9	(79)
Southwest _{0.9}	0.77	X	5.5	51	x	9	2.85			0.24	X	0.7	-		59.56	(79)
Southwest _{0.9}	0.77	x	0.6	35	x	9	2.85			0.24	X	0.7	=	:	7.03	(79)
Southwest _{0.9}	0.77	×	5.5	51	x	6	9.27]		0.24	X	0.7	=		44.43	(79)
Southwest _{0.9}	0.77	X	0.6	S5	x [6	9.27]		0.24	X	0.7	=		5.24	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	4	4.07			0.24	X	0.7	=		28.27	(79)
Southwest _{0.9}	0.77	x	0.6	35	x	4	4.07			0.24	x	0.7	=	:	3.34	(79)
Southwest _{0.9}	0.77	x	5.5	51	x	3	1.49			0.24	X	0.7	-		20.2	(79)
Southwest _{0.9}	0.77	X	0.6	35	x [3	1.49			0.24	×	0.7			2.38	(79)
					-									'		
Solar gains i	n watts, c	alculated	I for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	18.23	234.64	196	.79	151.24	96.8	55.44	38.05			(83)
Total gains -	internal a	and solar	· (84)m =	= (73)m	+ (8	33)m	, watts					_				
(84)m= 622.7	9 656.94	684.4	712.62	729.21	71	10.09	679.62	649	.56	621.77	598.6	4 592.15	601.12	2		(84)
7. Mean int	ernal tem	perature	(heating	season)											
Temperatui			, ,		<i>'</i>	area f	from Tal	ole 9,	, Th	1 (°C)					21	(85)
Utilisation fa	•	•			-					,						
Jan	T	Mar	Apr	May	r	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	;		
(86)m= 0.99	0.98	0.96	0.9	0.77	0).57	0.41	0.4	-	0.69	0.91	0.98	0.99			(86)
Mean interr	al tempe	ature in	living ar	aa T1 (fo	الد	w sta	ns 3 to 7	7 in T	ahle	9c)			•			
(87)m= 20.34	 	20.6	20.8	20.94	_	0.99	21	2	$\overline{}$	20.98	20.82	20.56	20.32	\neg		(87)
` ′				l				<u> </u>								` '
Temperatur (88)m= 20.17		20.17	eriods ir 20.18	20.18	_	eiiing 20.2	20.2	20.		20.19	20.18	20.18	20.18	\neg		(88)
(88)m= 20.17	20.17	20.17	20.10	20.10		20.2	20.2	20.	.2	20.19	20.10	20.16	20.10			(00)
Utilisation fa		1		· · ·			·	<u> </u>						_		
(89)m= 0.98	0.97	0.95	0.88	0.72	(0.5	0.34	0.3	37	0.62	0.88	0.97	0.99			(89)
Mean interr	al tempe	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_		
(90)m= 19.3	19.44	19.67	19.96	20.13	20	0.19	20.2	20.	.2	20.18	19.99		19.28			(90)
										f	LA = Li	ving area ÷ (4) =		0.26	(91)
Mean interr	al tempe	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2						
(92)m= 19.57	19.7	19.91	20.18	20.34	2	20.4	20.41	20.4	41	20.39	20.21	19.87	19.55			(92)
Apply adjus	tment to t	he mean	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate					
(93)m= 19.57	19.7	19.91	20.18	20.34	2	20.4	20.41	20.4	41	20.39	20.21	19.87	19.55			(93)
8. Space he	eating req	uirement														
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m	=(76)m an	d re-ca	lculate		
the utilisation	1			1			Ι	г.				 		_		
Jan		Mar	Apr	May	<u> </u>	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	<u>; </u>		
Utilisation for (94)m= 0.98	0.97	0.95	0.88	0.73).52	0.36	0.3	<u>, </u>	0.64	0.88	0.96	0.98			(94)
Useful gain				<u> </u>).JZ	0.30	0.5	9	0.04	0.00	0.90	0.90			(04)
(95)m= 610.6	1	647.51	624.44	533.14	36	89.15	243.92	255	.84	395.74	527.3	4 570.3	591.24	1		(95)
Monthly ave				l .	<u> </u>						02.10	. 0.0.0	1 00			(==)
(96)m= 4.3	4.9	6.5	8.9	11.7	_	4.6	16.6	16.	.4	14.1	10.6	7.1	4.2			(96)
Heat loss ra				<u> </u>			<u> </u>						<u> </u>			•
(97)m= 1019.5		890.14	737.34	563.16	_	72.11	244.15	256	_ т	405.7	626.1	837.01	1012.4	7		(97)
	_							L	!							

Space heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 304.21	233.35	180.52	81.29	22.33	0	0	0	0	73.52	192.03	313.39		
							Tota	l per year	(kWh/yea	r) = Sum(9	98)15,912 =	1400.63	(98)
Space heating	g require	ement in	kWh/m²	²/year								18.91	(99)
8c. Space co	oling red	quiremen	nt										
Calculated for	r June, c	July and	August.	See Tal	ble 10b					1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate (100)m= 0	e Lm (ca l 0	liculated 0	using 2	5°C inter	nal temp 602.87	perature 474.6	485.89	ernal ter	nperatur 0	e from 1	able 10)		(100)
Utilisation fac			0		002.07	474.0	403.09	0	0				(100)
(101)m = 0	0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
Useful loss, h	nmLm (V	vatts) = ((100)m >	ι ‹ (101)m	<u>!</u>	ļ				ļ			
(102)m= 0	0	0	0	0	566.25	462.49	468.37	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)		•			
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space cooling set (104)m to	•				dwelling,	continu	ous (kW	'h) = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
(104)m = 0	0	0	0	0	133.74	191.02	159.52	0	0	0	0		
` ′			Į	ļ	ļ	ļ		Tota	l = Sum(104)	<u>-</u>	484.28	(104)
Cooled fractio	n							f C =	cooled	area ÷ (4	4) =	0.6	(105)
Intermittency f				1	1	1				1	_		
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0 Tota	0	(104)	0		7(400)
Space cooling	requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	rota	I = Sum(104)	= [0	(106)
(107)m = 0	0	0	0	0	20.09	28.69	23.96	0	0	0	0		
	•							Tota	l = Sum((1,0,7)	=	72.75	(107)
Space cooling	requirer	ment in k	(Wh/m²/	year				(107)) ÷ (4) =		Ī	0.98	(108)
9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme)							
This part is us										unity scl	heme.		_
Fraction of spa	ace heat	from se	condary	/supplen	nentary l	heating ((Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system/	1 – (30	1) =						1	(302)
The community se									up to four	other heat	sources; th	e latter	
includes boilers, I Fraction of hea				aste neat i	rom powei	r stations.	See Appei	naix C.			Г	0.13	(303a
Fraction of co			•	ouroo 2							L		(303b
	•								40	> (0.87	=
Fraction of total	al space	heat fro	m Comr	nunity C	HP				(3	02) x (303	Ba) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	8b) =	0.87	(304b
Factor for con	trol and	charging	method	l (Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m				Γ	1.05	(306)
Space heatin	g										_	kWh/yea	 r
Annual space	_	requiren	nent									1400.63	
Space heat fro	om Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	= Γ	191.19	(307a)
											L		

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1279.47	(307b)
Efficiency of secondary/supplementary heating	system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/sup	plementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2063.55	٦
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	204.67	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	281.67 1885.05	(310a) (310b)
Electricity used for heat distribution	0	01 × [(307a)(307e) + (310a)(310e)] =	36.37	(313)
Cooling System Energy Efficiency Ratio	0.	01 x [(307a)(307e) + (310a)(310e)] =	4.73	(314)
	if not ontor (1)	= (107) ÷ (314) =		╡`
Space cooling (if there is a fixed cooling system	,	= (107) ÷ (314) =	15.4	(315)
Electricity for pumps and fans within dwelling (T mechanical ventilation - balanced, extract or po-		е	158.57	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix L)			325.25	(332)
Electricity generated by PVs (Appendix M) (neg	ative quantity)		-158.19	(333)
Electricity generated by wind turbine (Appendix	M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Appendix 10b. Fuel costs – Community heating scheme	M) (negative quantity)		0	(334)
	M) (negative quantity) Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	(334)
	Fuel	Fuel Price	Fuel Cost	(340a)
10b. Fuel costs – Community heating scheme	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scheme Space heating from CHP	Fuel kWh/year (307a) x	Fuel Price (Table 12) 2.97 x 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25	(340a) (340b)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93 2.03 20.92	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93 2.03 20.92 42.9	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93 2.03 20.92 42.9 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 5.68 54.25 8.37 79.93 2.03 20.92 42.9 120 -20.87	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) × (356)] ÷ [(4) + 45.0)] =		1.1	(357)
SAP rating (section12)				84.59	(358)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	303.47 ×	0.22	65.55	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	92.86 ×	0.52	-48.2	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	[(307b)	+(310b)] x 100 ÷ (367b) x	0.22	706.86	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 18.88	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	2)	768.66	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantar	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		768.66	(376)
CO2 associated with space cooling	J	(315) x	0.52	7.99	(377)
CO2 associated with electricity for	pumps and fans within dwe	lling (331)) x	0.52	= 82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 168.8	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applic	cable	0.52 x 0.01 =	-82.1	(380)
Total CO2, kg/year	sum of (376)(382) =			945.66	(383)
Dwelling CO2 Emission Rate	te $(383) \div (4) =$			12.77	(384)
El rating (section 14)				89.36	(385)
13b. Primary Energy – Community	heating scheme				7
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit		_		63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	$(307a) \times 100 \div (362) =$	303.47 ×	1.22	370.23	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	92.86 ×	3.07	-285.09	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	1.22	545.46	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	3.07	-420.02	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	3992.47	(368)
Electrical energy for heat distribution	on	[(313) x		111.67	(372)

Total Energy associated with community systems	(363)(366) + (368)(372)	=	4314.74	(373)
if it is negative set (373) to zero (unless specified otherwise	e, see C7 in Appendix C)		4314.74	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or insta	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			4314.74	(376)
Energy associated with space cooling	(315) x	3.07	=	47.27	(377)
Energy associated with electricity for pumps and fans within o	dwelling (331)) x	3.07	=	486.81	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	998.51	(379)
Energy saving/generation technologies					1
Item 1		3.07 × 0.01	=	-485.65	(380)
Total Primary Energy, kWh/year sum of (376	6)(382) =			5361.68	(383)

User D	etails:
	Stroma Number: STRO016363 Software Version: 1.0.4.10
	ddress: Flat 2-2-Green
Address:	
Overall dwelling dimensions: Area	(m²) Av. Height(m) Volume(m³)
	$\frac{1}{100}$ $\frac{1}$
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$	3.06 (4)
Dwelling volume	(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 197.76 (5)
	(3)
2. Ventilation rate: main secondary	other total m³ per hour
Number of chimneys	$0 = 0 \times 40 = 0 $ (6a)
	0 0 (64)
Number of intermittent fans	$0 \qquad \times 10 = \qquad 0 \qquad (7a)$
Number of passive vents	$0 \qquad \qquad \times 10 = \qquad \qquad 0 \tag{7b}$
Number of flueless gas fires	0 x 40 = 0 (7c)
	Air changes per hour
Infiltration due to chimneye fluor and fano - (63)±(6h)±(73)±(7h)±(7	,
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7a)$ If a pressurisation test has been carried out or is intended, proceed to (17), o	. , , , , , , , , , , , , , , , , , , ,
Number of storeys in the dwelling (ns)	0 (9)
Additional infiltration	[(9)-1]x0.1 = 0 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for	masonry construction 0 (11)
if both types of wall are present, use the value corresponding to the greated deducting areas of openings): if equal user 0.35	r wall area (after
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (seale	d), else enter 0 0 (12)
If no draught lobby, enter 0.05, else enter 0	0 (13)
Percentage of windows and doors draught stripped	0 (14)
Window infiltration	$0.25 - [0.2 \times (14) \div 100] = 0$ (15)
Infiltration rate	8) + (10) + (11) + (12) + (13) + (15) = 0 (16)
Air permeability value, q50, expressed in cubic metres per ho	
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise	. ,
Air permeability value applies if a pressurisation test has been done or a deg Number of sides sheltered	ee air permeability is being used 3 (19)
	$(10)^{20} = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor	21) = (18) x (20) = 0.12 (21)
Infiltration rate modified for monthly wind speed	
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec
Monthly average wind speed from Table 7	
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8	3.7 4 4.3 4.5 4.7
Wind Factor (22a)m = (22)m ÷ 4	
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95	0.92 1 1.08 1.12 1.18

0.15	ation rate	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1		
alculate effec		_	rate for t	he appli	cable ca	ise	ļ		ļ			J 		_
If mechanica				(. (00)	\ (22.\				0.5	(2:
If exhaust air he) = (23a)				0.5	(23
If balanced with		-	-	_									76.5	(2:
a) If balance			1	i		- 	- 	í `	r Ó - Ò		- `) ÷ 100] 7		(2
4a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J		(2
b) If balance			1	i	1		, 	ŕ	r Ó		Ι .	7		(2
(4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse ext n < 0.5 ×			•	•				5 v (23h	.\				
4c)m = 0	0.5 x	0	0	0 = (231)		0	$\frac{1}{1} = (221)$	0	0	0	0	1		(2
d) If natural												J		_
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
Effective air	change i	rate - er	 nter (24a) or (24l	b) or (24	c) or (24	ld) in bo	x (25)	•		•	-		
5)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	1		(2
B. Heat losses	s and ha	at loss r	narameti	or.	•							_		
LEMENT	Gros	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
	0.00												, ,	
	area	(m²)	m		Α,ι		W/m2		(W/ł	<)	kJ/m²-		kJ	J/K
oors	area ((m²)								<) 			kJ	J/K
		(m²)			1, A	m² x	W/m2	2K =	(W/ł	<) 			kJ	J/K (2
indows Type	: 1	(m²)			A ,ı	m ² x	W/m2	2K = 	(W/ł 3.12	<) 			kJ	J/K (2 (2
indows Type indows Type	e 1 e 2	(m²)			A ,ı 2.6	m ² x x1 x1	W/m2 1.2 /[1/(1.2)+	eK = 0.04] = 0.04] =	3.12 3.73	<) 			kJ	J/K (2 (2
indows Type indows Type indows Type	e 1 e 2 e 3	(m²)			A ,1 2.6 3.26 3.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	eK = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<)			k J	J/K (2 (2 (2
indows Type indows Type indows Type indows Type	2 2 3 4			<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	<)			kJ	J/K (; (; (; (;
indows Type indows Type indows Type indows Type alls Type1	2 2 3 4 38.14	4	20.58	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74 2.63				kJ	J/K (2 (2 (2 (2 (2
oors findows Type findows Type findows Type findows Type falls Type1 falls Type2	2 2 3 3 4 4 38.14 23.92	4 2	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2	<>			kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	23.92 3.14 23.92 5.95	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type3 alls Type4	38.14 23.92 5.95 29.5	4 2 5	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2				kJ	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
findows Type findows Type findows Type findows Type falls Type1 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 21.32 5.95 29.5	m² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.57 12.38	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	
indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 5.95 29.52	4 2 5 1 , m ²	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 = 0.04 = 0.04 = = = = = =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	K	kJ	//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area	23.92 23.92 23.92 23.92 29.52 29.52 29.52 29.52 29.52	4 2 5 1 , m ² ows, use e	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of	EK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	23.92 38.14 23.92 5.95 29.57 29.57 29.67 29.	4 2 1 1 , m ² ows, use e sides of in = S (A x	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	as given in	kJ/m²-	h 3.2	7.84	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 23.92 29.57 29	4 2 1 1 , m ² ows, use e sides of in = S (A x A x k)	20.58 2.6 0 0 orderective with the internal walk	8 8 Indow U-vi	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.33 5.95 12.38 76.06 76.06 alue calculatitions	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of	PK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2

	at loss							(33) +	(36) =			48.84	(3
entilation hea	at loss ca	alculated	l monthly	/		ı	1	(38)m	= 0.33 × ((25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(3
eat transfer	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m= 66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		
									•	Sum(39) ₁ .	12 /12=	64.8	(3
eat loss para	- `						I		= (39)m ÷	<u> </u>	1		
0.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84	0.84	0.85	0.86	0.86		— ,
umber of day	ys in mor	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	0.85	(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
						<u>l</u>	<u> </u>		l .	<u> </u>			
1. Water hea	ting ener	gy requi	rement:								kWh/ye	ear:	
	<u> </u>												
ssumed occu if TFA > 13.			[4 0)(0)	(0 0003	40 v /T	-A 12.0°	\2\1 · 0 ()012 v (TEA 10		38		(
ii 1FA > 13. if TFA £ 13.		+ 1.76 X	[ı - exp	(-0.0003	49 X (11	-A -13.9)2)] + 0.0) X C I U	IFA -13.	.9)			
nual averaç	•	ater usad	ge in litre	s per da	ıv Vd,av	erage =	(25 x N)	+ 36		90	.82		(
duce the annu									se target o		.02		`
t more that 125	litres per p	person per	day (all w	ater use, I	not and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usage i	in litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)				-		
1)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
	•									m(44) ₁₁₂ =	L	1089.8	
		used cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor	nth (see Ta	shlac 1h 1	c, 1d)		
ergy content of	f hot water	useu - car								, , , , , , , , , , , , , , , , , , ,			
, ——	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
5)m= 148.15	129.57	133.7	116.57				102.63	103.86	121.03	· ·		1428.9	
i)m= 148.15	129.57 vater heatir	133.7 ng at point	116.57 of use (no	hot water	storage),	enter 0 in	102.63 boxes (46,	103.86) to (61)	121.03 Total = Su	132.12 m(45) ₁₁₂ =	=	1428.9	
5) m = 148.15 $nstantaneous v$ $5) m = 22.22$	129.57 vater heatir 19.44	133.7	116.57				102.63	103.86	121.03	132.12		1428.9	
isim= 148.15 instantaneous v isim= 22.22 ater storage	129.57 vater heatin 19.44 loss:	133.7 ng at point 20.06	116.57 of use (no	hot water	storage), 14.48	enter 0 in 13.42	102.63 boxes (46) 15.39	103.86) to (61) 15.58	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	(
isi)m= 148.15 instantaneous v isi)m= 22.22 ater storage orage volum	129.57 vater heatin 19.44 loss: ne (litres)	133.7 ng at point 20.06 includir	116.57 of use (no. 17.48) ag any so	hot water 16.78 Dlar or W	storage), 14.48 /WHRS	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa	103.86) to (61) 15.58	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	=	1428.9	(
5)m= 148.15 nstantaneous v 6)m= 22.22 ater storage orage volum community h	129.57 vater heatin 19.44 loss: ne (litres) neating a	133.7 ng at point 20.06 includin nd no ta	of use (no 17.48 ag any so nk in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	(
5)m= 148.15 nstantaneous v 6)m= 22.22 eater storage eorage volum community h therwise if ne	129.57 vater heatin 19.44 loss: ne (litres) neating a o stored	133.7 ng at point 20.06 includin nd no ta	of use (no 17.48 ag any so nk in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ =	21.52	1428.9	
5)m= 148.15 nstantaneous v 6)m= 22.22 ater storage orage volum community h therwise if ne	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored	133.7 ang at point 20.06 includin ind no ta hot wate	of use (no 17.48 ag any so nk in dw er (this in	o hot water 16.78 Dlar or W relling, e	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
instantaneous voices ater storage volume community herwise if neater storage of the storage of t	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's de	133.7 ag at point 20.06 includin and no ta hot wate	of use (not) 17.48 ag any so ank in dwer (this in oss factors)	o hot water 16.78 Dlar or W relling, e	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86) to (61) 15.58 ame ves	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v nstantaneous v 22.22 ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum community h therwise if no ater storage orage volum	129.57 vater heatir 19.44 loss: ne (litres) neating a constored loss: turer's defactor from	133.7 ang at point 20.06 includin and no ta hot wate eclared le	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b	o hot water 16.78 Dlar or W relling, e reludes i	14.48 /WHRS nter 110	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
nstantaneous v nstantaneous v nstantaneous v nstantaneous v 22.22 ater storage orage volum community h therwise if no ater storage If manufact emperature f nergy lost fro	129.57 vater heatin 19.44 loss: ne (litres) neating a costored closs: turer's defactor from water	133.7 ang at point 20.06 including and no tale to the water of the colored leading at the	of use (not) 17.48 ag any so ank in dwer (this in oss factor) 2b , kWh/ye	o hot water 16.78 Dlar or W relling, e reludes i	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous co	102.63 boxes (46) 15.39 within sa (47)	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	(
instantaneous v instantaneous	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's defactor from water turer's defactor from	133.7 ang at point 20.06 includir and no ta hot wate eclared le m Table storage eclared of	of use (not) 17.48 ag any so ank in dwer (this in coss factors) 2b , kWh/ye	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	()
instantaneous v instantaneous	129.57 vater heatin 19.44 19.44 loss: ne (litres) neating a constored stored stored factor from water turer's deage loss neating s	133.7 ng at point 20.06 includin and no ta hot wate eclared le m Table storage eclared of	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b , kWh/ye cylinder I com Tabl	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	()
instantaneous v instantaneous	129.57 vater heating 19.44 no stored loss: turer's defactor from water turer's deage loss neating safe from Tal	133.7 ang at point 20.06 includin and no ta hot wate eclared le storage eclared of factor fr ee section	of use (not) 17.48 ag any so ank in dwer (this in) 0ss factor 2b 4, kWh/ye cylinder I om Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82	21.52	1428.9	
instantaneous v instantaneous	129.57 vater heating 19.44 no stored loss: turer's defactor from water turer's deage loss neating safe from Tal	133.7 ang at point 20.06 includin and no ta hot wate eclared le storage eclared of factor fr ee section	of use (not) 17.48 ag any so ank in dwer (this in) 0ss factor 2b 4, kWh/ye bylinder I om Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 to (61) 15.58 ame vess	121.03 Total = Su 18.16	132.12 m(45) ₁₁₂ = 19.82 47)	21.52 0 0 0 10	1428.9	
instantaneous v	129.57 vater heatin 19.44 closs: ne (litres) neating a o stored closs: turer's de factor from turer's de rage loss neating s from Tal	133.7 ang at point 20.06 includir and no ta hot wate eclared le m Table storage eclared of factor fr ee section ble 2a m Table	of use (not) 17.48 ag any so ank in dwer (this in) coss factor 2b , kWh/ye cylinder I com Table on 4.3	o hot water 16.78 Diar or W relling, e rellings i or is kno ear oss factor e 2 (kW)	14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage 0 litres in neous co	102.63 boxes (46) 15.39 within sa (47) ombi boild	103.86 0 to (61) 15.58 ame vesters) enter	121.03 Total = Sul 18.16 sel er '0' in (132.12 m(45) ₁₁₂ = 19.82 47)	21.52 0 0 0 10 02	1428.9	

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	55 × (41)	m				l	
(modified by				•	,	` '	` '		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	r heating)		
(add additiona	al lines if	FGHRS	and/or \	vwhrs	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter	-		-	-		-		-			
(64)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
		!					Outp	out from wa	ater heate	r (annual)₁	12	2079.74	(64)
Heat gains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	_
(65)m= 93.48	83.02	88.68	81.55	81.41	74.89	73.96	<u> </u>	_		<u> </u>	<u> </u>	·	(65)
			01.00	01.41	14.03	73.90	78.35	77.33	84.47	86.72	91.93		(65)
include (57)	m in cal		<u> </u>		<u> </u>	<u> </u>				<u> </u>		eating	(03)
include (57) 5. Internal q		culation o	of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i:	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(66)
5. Internal g Metabolic gain Jan	ains (see ns (Table Feb 143.03	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 143.03	only if constant of the consta	Jun 143.03	Jul 143.03	Aug 143.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 143.03	ains (see ns (Table Feb 143.03	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 143.03	only if constant of the consta	Jun 143.03	Jul 143.03	Aug 143.03	Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03	res (Table Feb 143.03 (calcula 41.77	E Table 5 E 5), Wat Mar 143.03 ted in Ap 33.97	of (65)m 6 and 5a ts Apr 143.03 opendix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	Jul 143.03 r L9a), a	Aug 143.03 Iso see	Sep 143.03 Table 5 30.6	Oct 143.03	Nov	Dec 143.03	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains	res (Table Feb 143.03 (calcula 41.77	E Table 5 E 5), Wat Mar 143.03 ted in Ap 33.97	of (65)m 6 and 5a ts Apr 143.03 opendix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	Jul 143.03 r L9a), a	Aug 143.03 Iso see	Sep 143.03 Table 5 30.6	Oct 143.03	Nov	Dec 143.03	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21	culation of Table 5 (a) Wat Mar 143.03 (b) 143.97 (c) 1	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if construction in the construction in th	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	Aug 143.03 lso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11	Nov 143.03	Dec 143.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21	culation of Table 5 (a) Wat Mar 143.03 (b) 143.97 (c) 1	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if construction in the construction in th	Jun 143.03 ion L9 o 16.23 uation L 249.51	Jul 143.03 r L9a), a 17.54 13 or L1 235.61	Aug 143.03 lso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11	Nov 143.03	Dec 143.03	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21 s (calcula 51.69	culation of Table 5 2 5), Wat Mar 143.03 ted in Ap 33.97 culated in 309.97 ated in A 51.69	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 n Append 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 of 16.23 uation L 249.51 ion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a)	Aug 143.03 Iso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11 5	Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69	res (Table Feb 143.03 (calcula 41.77 tins (calcula 318.21 s (calcula 51.69	culation of Table 5 2 5), Wat Mar 143.03 ted in Ap 33.97 culated in 309.97 ated in A 51.69	of (65)m 5 and 5a ts Apr 143.03 opendix 25.72 n Append 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 of 16.23 uation L 249.51 ion L15	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a)	Aug 143.03 Iso see 22.8 3a), also 232.34	Sep 143.03 Table 5 30.6 see Tal 240.58	Oct 143.03 38.85 ble 5 258.11 5	Nov 143.03 45.34 280.24	Dec 143.03 48.34 301.04	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa	res (Table Feb 143.03 (calcula 41.77 sins (calcula 51.69 ns gains 0	culation of the culation of th	of (65)m 5 and 5a ts Apr 143.03 ppendix 25.72 Appendix 292.44 ppendix 51.69 5a) 0	only if constructions: May 143.03 L, equation 19.22 dix L, equation 270.31 L, equation 51.69	Jun 143.03 ion L9 of 16.23 uation L 249.51 cion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 lso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0	res (Table Feb 143.03 (calcula 41.77 sins (calcula 51.69 ns gains 0	culation of the culation of th	of (65)m 5 and 5a ts Apr 143.03 ppendix 25.72 Appendix 292.44 ppendix 51.69 5a) 0	only if constructions: May 143.03 L, equation 19.22 dix L, equation 270.31 L, equation 51.69	Jun 143.03 ion L9 of 16.23 uation L 249.51 cion L15 51.69	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 lso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 143.03 (calcula 41.77 tins (calcula 51.69 ns gains 0 vaporatio -95.35	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 143.03 ppendix 25.72 Append 292.44 ppendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 0 16.23 uation L 249.51 ion L15 51.69 0	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
5. Internal g Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35	res (Table Feb 143.03 (calcula 41.77 tins (calcula 51.69 ns gains 0 vaporatio 95.35 gains (Table Feb 143.03 (calcula 151.69 ns gains (Table Feb 143.03 (ca	culation of the Europe Solution of the Europe	of (65)m s and 5a ts Apr 143.03 ppendix 25.72 Append 292.44 ppendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 0 16.23 uation L 249.51 ion L15 51.69 0	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69	Oct 143.03 38.85 ble 5 258.11 5 51.69	Nov 143.03 45.34 280.24 51.69	Dec 143.03 48.34 301.04 51.69	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35 Water heating	res (Table Feb 143.03 (calcula 41.77 tims (calcula 51.69 ms gains 0 vaporatio 123.55	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe	of (65)m of and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 o tive valu -95.35	only if constructions only if constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69 0	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69 0 -95.35	Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	Nov 143.03 45.34 280.24 51.69 0	Dec 143.03 48.34 301.04 51.69 0	eating	(66) (67) (68) (69) (70) (71)
Metabolic gain Jan (66)m= 143.03 Lighting gains (67)m= 47.03 Appliances ga (68)m= 314.94 Cooking gains (69)m= 51.69 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35 Water heating (72)m= 125.65	res (Table Feb 143.03 (calcula 41.77 tims (calcula 51.69 ms gains 0 vaporatio 123.55	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe Solution (negation of the Europe Solution of the Europe	of (65)m of and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 o tive valu -95.35	only if constructions only if constructions	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69	Aug 143.03 Iso see 22.8 3a), also 232.34 , also se 51.69 0	Sep 143.03 Table 5 30.6 See Tal 240.58 ee Table 51.69 0 -95.35	Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	Nov 143.03 45.34 280.24 51.69 0	Dec 143.03 48.34 301.04 51.69 0	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

	_								. –						_		_
Southw	est _{0.9x}	0.77	X	0.6	65	X	1	04.39	L		0.24	x	0.7		= <u>[</u>	7.9	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	x	0.7	:	= [59.56	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	X	9	2.85			0.24	x	0.7	:	= [7.03	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	x	6	9.27			0.24	x	0.7	:	= [44.43	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	6	9.27			0.24	x	0.7	:	= [5.24	(79)
Southw	est _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	x	0.7	:	= [28.27	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	4	4.07			0.24	x	0.7	:	= [3.34	(79)
Southw	est _{0.9x}	0.77	x	5.5	51	x	3	1.49			0.24	x	0.7		<u> </u>	20.2	(79)
Southw	est _{0.9x}	0.77	X	0.6	65	x	3	1.49			0.24	x	0.7		<u> </u>	2.38	(79)
	_								_			_					_
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m :	= Su	m(74)m .	(82)m					
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.7	79	151.24	96.8	55.44	38.05	5		(83)
Total g	ains – iı	nternal a	and solar	(84)m =	= (73)m -	+ (8	33)m	, watts					_	_			
(84)m=	632.31	666.4	693.47	721.08	737.03	7′	17.34	686.56	656.	6	629.18	606.65	600.84	610.3	5		(84)
7. Me	an inter	nal temp	perature	(heating	season)											
Temp	erature	during h	neating p	eriods ir	n the livii	ng :	area t	from Tab	ole 9,	Th1	(°C)				Γ	21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	ea, h1,m	(se	ee Ta	ble 9a)			` ,				L		
	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Au	g	Sep	Oct	Nov	De	С		
(86)m=	0.99	0.98	0.96	0.9	0.76	(0.56	0.41	0.44	1	0.68	0.91	0.97	0.99			(86)
Mean	interna	l temner	ature in l	living ar	22 T1 (fc	مااه	w sta	ns 3 to 7	in Ts	ahle	9c)						
(87)m=	20.37	20.47	20.62	20.82	20.95	_	0.99	21	21	$\overline{}$	20.98	20.84	20.58	20.35	5		(87)
			<u> </u>														` ,
· 1	erature 20.19	20.2	eating p	erioas ir 20.21	20.21	_	eiiing 0.22	20.22	20.2	$\overline{}$	20.22	20.21	20.21	20.2	\neg		(88)
(88)m=			<u> </u>								20.22	20.21	20.21	20.2			(00)
ı			ains for r			_	<u> </u>		9a)						_		
(89)m=	0.98	0.97	0.95	0.87	0.71		0.5	0.34	0.37	7	0.61	0.88	0.97	0.99			(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng	T2 (f	ollow ste	ps 3 1	to 7	in Tabl	e 9c)					
(90)m=	19.37	19.51	19.73	20.01	20.16	2	0.22	20.22	20.2	2	20.2	20.04	19.69	19.35	5		(90)
											f	LA = Livir	ng area ÷ (4	4) =		0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1 –	- fL/	A) × T2						
(92)m=	19.63	19.75	19.96	20.22	20.37	_	0.42	20.42	20.4	-	20.4	20.24	19.92	19.61			(92)
Apply	adjustn	nent to t	he mean	internal	temper	atu	re fro	m Table	4e, w	vher	re appro	priate					
(93)m=	19.63	19.75	19.96	20.22	20.37	2	0.42	20.42	20.4	2	20.4	20.24	19.92	19.61			(93)
8. Spa	ace hea	ting requ	uirement														
			ernal ter	•		ed	at ste	ep 11 of	Table	9b	, so tha	t Ti,m=(76)m an	d re-ca	alc	ulate	
the ut		1	or gains u			_				_			1	Ι	_		
Lice	Jan	Feb	Mar	Apr	May		Jun	Jul	Au	g	Sep	Oct	Nov	De	С		
i	0.98	o.97	ains, hm _{0.95}		0.72	_	. 51	0.25	0.20	$\overline{}$	0.62	0.88	0.06	0.00	\neg		(94)
(94)m=				0.87			0.51	0.35	0.39	<u>, </u>	0.63	0.00	0.96	0.98			(34)
(95)m=	619.92	646.73	, W = (94 655.34	629.43	533.92	36	 58.11	243.17	255.	1	395.47	532.19	578.3	600.3	1		(95)
			rnal tem			L		2 10.17	200.	<u>' </u>	JUJ†1	552.15	1 37 3.3	1 300.5			(55)
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.4	ı T	14.1	10.6	7.1	4.2			(96)
			an intern					<u> </u>					<u> </u>	<u> </u>			
(97)m=	1014.49		885.73	733.89	560.3		70.53	243.35	255.4		403.9	623.51	833.54	1008.0)2		(97)
` '								L									

Space heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 293.56	224.07	171.41	75.21	19.62	0	0	0	0	67.94	183.77	303.34		_
							Tota	l per year	(kWh/year	r) = Sum(9	08)15,912 =	1338.92	(98)
Space heatin	g require	ement in	kWh/m²	²/year								17.6	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo					ble 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	e Lm (ca	liculated 0	using 2	o inter	598.91	erature 471.48	482.78	ernal ter	nperatur 0	e from 1	able 10)		(100)
Utilisation fac			0		390.91	471.40	402.70	0		0			(100)
(101)m= 0	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
Useful loss, h	ımLm (V	Vatts) = ((100)m >	ι ‹ (101)m		ļ				<u> </u>			
(102)m= 0	0	0	0	0	566.6	461.21	467.74	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	•	•			
(103)m= 0	0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
Space cooling set (104)m to	• .				dwelling,	continu	ous (kW	h') = 0.0)24 x [(10	03)m – (102)m]x	(41)m	
(104)m = 0	0	0	0	0	138.71	197.13	165.24	0	0	0	0		
(101)								<u> </u>	l = Sum(=	501.07	(104)
Cooled fraction	n								cooled	,	4) =	0.59	(105)
Intermittency f	actor (Ta	able 10b)										_
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		- 1
Space cooling	roquiror	mont for	month -	. (104)m	× (105)	v (106)r	m	l ota	I = Sum((104)	= [0	(106)
(107)m= 0	0	0	0	0	20.29	28.83	24.17	0	0	0	0		
` ′								 Tota	I I = Sum(107)	=	73.29	(107)
Space cooling	requirer	ment in k	(Wh/m²/	year) ÷ (4) =		ř	0.96	(108)
9b. Energy red	•				scheme)			, , ,		L		
This part is us	•		· ·	Ŭ			ting prov	ided by	a comm	unity scl	neme		
Fraction of spa	ace heat	from se	condary	/supplen	nentary l	heating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	/ system	1 – (30	1) =					Γ	1	(302)
The community so includes boilers, h									up to four	other heat	sources; the	e latter	
Fraction of hea	at from C	Commun	ity CHP		·						Γ	0.13	(303a
Fraction of cor	nmunity	heat fro	m heat s	source 2							Ī	0.87	(303b
Fraction of total	al space	heat fro	m Comr	nunity C	HP				(3	02) x (303	(a) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	eat sourc	e 2			(3	02) x (303	(sb) =	0.87	(304b
Factor for cont	trol and	charging	method	l (Table	4c(3)) fo	r comm	unity hea	nting sys	tem		Ī	1	(305)
Distribution los	ss factor	(Table 1	2c) for (commun	ity heati	ng syste	m				Ī	1.05	(306)
Space heating	g										_	kWh/yea	 r
Annual space	heating	requiren	nent									1338.92	
Space heat fro	om Comi	munity C	HP					(98) x (3	04a) x (30	5) x (306)	- [182.76	(307a)
											_		

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1223.1	(307b)
Efficiency of secondary/supplementary heating	g system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/se	upplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2079.74	7
If DHW from community scheme:		(0.4) (0.00 -) (0.00)		
Water heat from Community CHP		(64) x (303a) x (305) x (306) =	283.88	(310a)
Water heat from heat source 2		$(64) \times (303b) \times (305) \times (306) =$	1899.84	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =	35.9	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling syste	,	= (107) ÷ (314) =	15.51	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or p		e	162.85	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Appendix L)			332.22	(332)
Electricity generated by PVs (Appendix M) (ne	egative quantity)		-162.5	(333)
Electricity generated by wind turbine (Append	ix M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Append 10b. Fuel costs – Community heating scheme	, , , , , , , , , , , , , , , , , , , ,		0	(334)
	, , , , , , , , , , , , , , , , , , , ,	Fuel Price (Table 12)	Fuel Cost £/year	(334)
	e Fuel		Fuel Cost	(334)
10b. Fuel costs – Community heating schem	Fuel kWh/year	(Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scheme	Fuel kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86	(340a) (340b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86 8.43	(340a) (340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86 8.43	(340a) (340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 x 0.01 = 2.97 x 0.01 = 2.97 x 0.01 = 4.24 x 0.01 = Fuel Price 13.19 x 0.01 =	Fuel Cost £/year 5.43 51.86 8.43 80.55	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86 8.43 80.55	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86 8.43 80.55 2.05 21.48	(340a) (340b) (342a) (342b) (348) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.001 = 2.97 4.24 2.001 = 4.24 Fuel Price 13.19 13.19 13.19 13.19 13.19 13.19 13.19	Fuel Cost £/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 12) 2.97 4.24 2.97 2.97 2.97 2.001 = 2.97 4.24 2.001 = 4.24 Fuel Price 13.19 13.19 13.19 13.19 13.19 13.19 13.19	Fuel Cost £/year 5.43 51.86 8.43 80.55 2.05 21.48 43.82 120 -21.43	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =		1.08	(357)
SAP rating (section12)				84.89	(358)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	290.1 ×	0.22	62.66	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	88.77 ×	0.52	-46.07	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP using	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	! [(307b)	+(310b)] x 100 ÷ (367b) x	0.22	= 697.58	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 18.63	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37		= 758.56	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantan	eous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		758.56	(376)
CO2 associated with space cooling	J	(315) x	0.52	= 8.05	(377)
CO2 associated with electricity for	pumps and fans within dwel	lling (331)) x	0.52	= 84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 172.42	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applic	cable	0.52 x 0.01 =	-84.34	(380)
Total CO2, kg/year	sum of (376)(382) =			939.22	(383)
Dwelling CO2 Emission Ra	te (383) ÷ (4) =			12.35	(384)
El rating (section 14)				89.6	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	$(307a) \times 100 \div (362) =$	290.1 ×	1.22	353.92	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	88.77 ×	3.07	-272.52	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	1.22	549.74	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 X	3.07	-423.31	(366)
Efficiency of heat source 2 (%)	If there is CHP using	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	= 3940.01	(368)
Electrical energy for heat distribution	on	[(313) x		= 110.2	(372)

Total Energy associated with community systems	(363)(366) + (368)(372))	=	4258.04	(373)
if it is negative set (373) to zero (unless specified otherwise	, see C7 in Appendix C)			4258.04	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or instar	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			4258.04	(376)
Energy associated with space cooling	(315) x	3.07	=	47.62	(377)
Energy associated with electricity for pumps and fans within o	welling (331)) x	3.07	=	499.96	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1019.91	(379)
Energy saving/generation technologies					7
Item 1		3.07 × 0.01	=	-498.87	(380)
Total Primary Energy, kWh/year sum of (376	i)(382) =			5326.65	(383)

Sasessor Name: Chris Hocknell Stroma Number: STRO016363 Version: 1.0.4.10			l lser I)etails: _						
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.10	Assessor Name:	Chris Hocknell	<u> </u>		a Num	ber:		STRO	016363	
## Acade Sea										
Basement Area(m²)		F	Property	Address	Flat 3-	1-Green				
Basement		pnoiono:								
Basement	1. Overall dwelling diffie	ensions.	Are	a(m²)		Av. He	iaht(m)		Volume(m ³	³)
Dwelling volume	Basement				(1a) x			(2a) =	<u>`</u>	<u> </u>
2. Ventilation rate: main heating heati	Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) -	74.06	(4)			_		
Number of chimneys	Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
Number of chimneys									73233	
Number of chimneys	2. Ventuation rate.		ry	other		total			m³ per hou	ır
Number of intermittent fans	Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of passive vents	Number of open flues	0 + 0	- +	0	j = [0	x	20 =	0	(6b)
Number of flueless gas fires	Number of intermittent fa	ins			, <u> </u>	0	x '	10 =	0	(7a)
Air changes per hour	Number of passive vents	3			Ē	0	x .	10 =	0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	Number of flueless gas f	ires			F	0	X 4	40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					L					
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns)					_			Air ch	nanges per ho	our —
Number of storeys in the dwelling (ns) 0 (9)		•			continue fr			÷ (5) =	0	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 · [0.2 × (14) ÷ 100] = Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 · [0.075 × (19)] = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4			id to (11),	ouror wide (onunae n	0111 (0) 10	(10)		0	(9)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) ÷ 100] = 0 Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Additional infiltration						[(9)	-1]x0.1 =	0	(10)
deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14) Window infiltration 0.25 - [0.2 x (14) ÷ 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17) If based on air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered 2 (19) Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7 (22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 <					•	ruction			0	(11)
If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ÷ 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) (17) (18) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4			o tne grea	ter wall are	a (atter					
Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times$	•	,	.1 (seal	ed), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (14) + 100] = 0.015$ Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0.016$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3.017 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered $2.015 = 0.075 \times (19) = 0.075 \times (19) = 0.075 \times (19) = 0.013$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.13$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor $(22a)m = (22)m \div 4$	•	•							0	=
Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	•	s and doors draught stripped		0 25 - [0 2	x (14) ÷ 1	1001 =				= ' '
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$				-	. ,	-	+ (15) =			=
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.85 (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.13 (21)$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$		q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area		=
Number of sides sheltered	If based on air permeabi	lity value, then $(18) = [(17) \div 20] + (18)$	(8), otherw	vise (18) = (16)				0.15	(18)
Shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.85 $			ne or a de	gree air pe	rmeability	is being u	sed			_
Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = $		ed		(20) = 1 -	[0.0 75 x (1	19)] =				→ ' '
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		ting shelter factor				,-				=
Monthly average wind speed from Table 7 (22)m= $\begin{bmatrix} 5.1 & 5 & 4.9 & 4.4 & 4.3 & 3.8 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$ Wind Factor (22a)m = (22)m \div 4	·	•							00	` ′
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m ÷ 4	Monthly average wind sp	peed from Table 7							_	
	(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
	Wind Factor (22a)m = (2	2)m ÷ 4								
			0.95	0.92	1	1.08	1.12	1.18		

0.16	0.16	0.16	ing for sh	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1		
alculate effec	ctive air c	hange	rate for t	he appli	cable ca	ise	<u> </u>		<u> </u>					
If mechanica													0.5	(2
If exhaust air he) = (23a)				0.5	(2
If balanced with		-	-	_									6.5	(2
a) If balance				—	1	- ` ` 	- 	í `	r Ó Ó		- ` `) ÷ 100] ⊓		(2
4a)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	J		(2
b) If balance				i	1	, 	- ^ ` ` - 	ŕ	r Ó		Ι .	1		(2
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse extı ∩ < 0.5 ×			•	•				5 v (23h	.\				
4c)m= 0	0.5 x	0	0	0	0	0	0	0	0	0	0	1		(2
d) If natural												J		
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
Effective air	change r	ate - er	nter (24a) or (24l	o) or (24	c) or (24	ld) in bo	x (25)	•		•	-		
5)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	1		(2
. Heat losses	s and has	at lose r	narameti	ar:								-		
LEMENT	Gross	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
		_	O P 0				•							
	area ((m²)	m) ²	A ,r	n²	W/m2	2K	(W/ł	<)	kJ/m²•	K	kJ	/K
oors	area ((m²)	r	1 ²	A ,r	m² x	W/m2	2K =	(W/ł 3.12	<) 	kJ/m²-	K	kJ	
		(m²)	rr	1 ²		x x		=	` `	<) 	kJ/m²•	K	kJ	(:
indows Type	: 1	(m²)	m) ²	2.6	x x1	1.2	= 0.04] =	3.12	<) 	kJ/m²•	K	kJ	(:
indows Type indows Type	e 1 e 2	(m²)	m	12	3.26	x x1 x1	1.2 /[1/(1.2)+	= (0.04] = (0.04] =	3.12	<) 	kJ/m²-	K	kJ	(; (; (;
indows Type indows Type indows Type	2 3	(m²)	m	12	2.6 3.26 3.95	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<) 	kJ/m²-	K	kJ	(; (; (;
indows Type indows Type indows Type indows Type	2 3		20.58		2.6 3.26 3.95 5.51	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31	<)	kJ/m²-	K	kJ	(1)
oors indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4	3			2.6 3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74		kJ/m²-	K	kJ	(1) (1) (2) (2) (3)
indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4 67.78 24.47	3 7	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87	x x1 x1 x1 x1 x1 x1 x x1 x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28		kJ/m²-	K	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	67.78 64 67.78 24.47 5.93	3	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93	x x1 x1 x1 x1 x1 x1 x x1 x x1 x x1 x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89		kJ/m²-	K	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72	x x1 x1 x1 x1 x1 x x x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		kJ/m²-	к _ _ _ _	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e arty wall	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e arty wall arty floor	67.78 67.78 24.47 5.93	3 7 2 2	20.56		2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38	x x1 x1 x1 x1 x1 x x1 x x2 x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		kJ/m²-	к 	kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and	67.78 67.78 24.47 5.93 19.72 Ilements,	3 7 2 m ² ws, use 6	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculus	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] =	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				kJ	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and include the area	24.47 5.93 19.72 1 roof windoons on both s	m ² ws, use e	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculus	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96				kJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 of otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	24.47 5.93 19.72 19.72 19.72 19.75 19.	m ² ws, use esides of ir: S (A x	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculus	x x1 x1 x1 x1 x1 x x1 x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96	s given in	paragrap	h 3.2	0.89	
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 oof otal area of e	24.47 5.93 19.72 1ements, 1roof windo as on both ses, W/K = Cm = S(A	m ² m ² ms, use esides of interest in the state of the	20.58 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 47.2 21.87 5.93 19.72 117.9 12.38 74.06 54.34 alue calculatitions	x x1 x1 x1 x1 x1 x x x x x x x x x x x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 7.08 3.28 0.89 2.96		paragrap	h 3.2		/K (3 (3 (3 (3 (3 (3 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4

Total fabric he	-41	are not hir	own (36) =	- 0.70 X (0	,			(00)	(0.0)		Г		–
\/antilation ba		alouloto d	manthl						(36) =	25\m v (5\		63.71	(37)
Ventilation hea					luna	ll	۸	` ,	,	25)m x (5)			
(38)m= 17.8	Feb 17.59	Mar 17.39	Apr 16.38	May 16.18	Jun 15.16	Jul 15.16	Aug 14.96	Sep 15.57	Oct 16.18	16.58	Dec 16.99		(38)
` ′			10.36	10.16	15.16	15.16	14.96			<u> </u>	10.99		(30)
Heat transfer of						i		· ,	= (37) + (
(39)m= 81.5	81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		–
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	80.03	(39)
(40)m= 1.1	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.08	1.09		
								,	Average =	Sum(40) ₁ .	12 /12=	1.08	(40)
Number of day	ys in mor	nth (Tabl	e 1a)							1	1		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ener	av requi	rement:								kWh/ye	ar:	
n. Water nea	ung onoi	gy roqui	romont.								icvvii, y c		
Assumed occu											34		(42)
if TFA > 13.		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9))2)] + 0.0	0013 x (¯	ΓFA -13.	.9)			
if TFA £ 13. Annual averag	•	otor ucoc	o in litro	s por do	w Vd av	orago –	(25 v NI)	. 26					(40)
Reduce the annua									se target o		.79		(43)
not more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i				,			,	ООР					
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
								-	Total = Su	m(44) _{1 12} =	₌	1077.45	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	1077.45	(44)
,								kWh/mor	th (see Ta	ables 1b, 1	c, 1d)	1077.45	(44)
	f hot water 128.1	used - calo	culated mo	onthly = 4.	190 x Vd,r 95.42	m x nm x D 88.42	0Tm / 3600 101.47	102.68	th (see Ta	130.62	c, 1d)		」 ` ′
(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	ables 1b, 1	c, 1d)	1077.45 1412.71	(44)
(45)m= 146.47	128.1 vater heatin	132.19	115.25 of use (no	110.58 hot water	95.42 storage),	88.42 enter 0 in	101.47 boxes (46,	102.68 106 (61)	119.66 Total = Su	130.62 m(45) ₁₁₂ =	c, 1d) 141.85		(45)
(45)m= 146.47 If instantaneous w (46)m= 21.97	128.1 vater heatir 19.22	132.19	115.25	110.58	95.42	88.42	101.47	102.68	th (see Ta	130.62	c, 1d)		(45)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage	128.1 vater heatin 19.22 loss:	132.19 ng at point 19.83	115.25 of use (no	110.58 hot water 16.59	95.42 storage),	88.42 enter 0 in	101.47 boxes (46) 15.22	102.68 106 to (61)	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d) 141.85		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum	128.1 vater heatin 19.22 loss: ne (litres)	132.19 ng at point 19.83 includin	115.25 of use (no 17.29 g any so	110.58 hot water 16.59 Dlar or W	95.42 storage), 14.31	88.42 enter 0 in 13.26 storage	101.47 boxes (46) 15.22 within sa	102.68 106 to (61)	119.66 Total = Su 17.95	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h	128.1 vater heatin 19.22 loss: ne (litres) neating a	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 g any so nk in dw	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored	132.19 ng at point 19.83 includin nd no ta	of use (no 17.29 g any so nk in dw	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS	enter 0 in 13.26 storage	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ =	c, 1d) 141.85 21.28		(45) (46)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no	128.1 vater heatin 19.22 ne (litres) neating a o stored	132.19 ng at point 19.83 includin nd no ta hot wate	of use (no 17.29 g any so nk in dw er (this in	110.58 hot water 16.59 Dlar or Welling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28		(45) (46) (47)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored loss: turer's de	132.19 ng at point 19.83 includin nd no ta hot wate	of use (no 17.29 g any so nk in dw er (this in	110.58 hot water 16.59 Dlar or Welling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 106 (61) 15.4 15.4	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28		(45) (46) (47)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f	19.22 19.22 10ss: ne (litres) neating a constored construction for factor from	132.19 ng at point 19.83 includin nd no ta hot wate eclared lo	of use (not) 17.29 g any so nk in dw er (this in) coss factor 2b	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS nter 110	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous w (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro	128.1 vater heatin 19.22 loss: ne (litres) neating a o stored loss: turer's defactor fro	132.19 Ing at point 19.83 includin Ind no ta hot wate eclared le m Table storage	of use (not) 17.29 g any sonk in dwer (this in) coss factor 2b , kWh/ye	110.58 hot water 16.59 blar or W relling, e	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47)	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact	128.1 19.22	132.19 Ing at point 19.83 includin ind no ta hot wate eclared lo m Table storage eclared of	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 21.28 0		(45) (46) (47) (48) (49) (50)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water storage If community h	19.22 loss: ne (litres) neating a stored loss: turer's defactor from water turer's defage loss neating s	132.19 Ing at point 19.83 including and no tale to the water eclared left storage eclared of factor free sections.	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I om Tabl	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0 10		(45) (46) (47) (48) (49) (50)
445)m= 146.47 If instantaneous v 46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stor If community h Volume factor	128.1 19.22 10ss: ne (litres) neating a costored closs: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including and no tale and no tale and reclared to factor free sections and the second	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59	c, 1d) 141.85 = 21.28 0 10		(45) (46) (47) (48) (49)
(45)m= 146.47 If instantaneous v (46)m= 21.97 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stor If community h Volume factor	128.1 19.22 10ss: ne (litres) neating a costored closs: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including and no tale and no tale and reclared to factor free sections and the second	of use (not) 17.29 g any so nk in dw er (this in) coss facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 blar or W relling, e reludes in or is known	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous co	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 1 to (61) 15.4 ame vess	119.66 Total = Su 17.95 Sel	130.62 m(45) ₁₁₂ = 19.59 47)	c, 1d) 141.85 = 21.28 0 0 10 02		(45) (46) (47) (48) (49) (50) (51)
If instantaneous was (46)m= 21.97 Water storage Storage volum If community h Otherwise if not Water storage a) If manufact Temperature f Energy lost from	128.1 19.22 10.55: ne (litres) neating a constored a loss: turer's defactor from water turer's defage loss neating serion Tal	132.19 Ing at point 19.83 Including the modern of the storage electron from the secured of th	of use (not) 17.29 g any so nk in dw er (this in) css facto 2b , kWh/ye cylinder I com Tabl con 4.3	110.58 hot water 16.59 olar or Water celling, eacludes in the control of the	95.42 storage), 14.31 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.26 storage litres in neous con/day): known:	101.47 boxes (46, 15.22 within sa (47) mbi boile	102.68 102.68 10 to (61) 15.4 ame vessers) enter	119.66 Total = Su 17.95 sel er '0' in (130.62 m(45) ₁₁₂ = 19.59 19.59 10	c, 1d) 141.85 = 21.28 0 0 10 02 03		(45) (46) (47) (48) (49) (50) (51) (52)

Water storage	e loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circu	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat red	quired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	vater hea	iter		-	-	-	-			-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•	•			•		Outp	out from wa	ater heate	r (annual) ₁	12	2063.55	(64)
Heat gains from	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 92.92	82.54	88.17	81.11	00.00	74.50		i			1	1	l	
· /	0=.0.	00.17	01.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
include (57	<u> </u>			!	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation o	of (65)m	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57	m in cal	culation of Table 5	of (65)m and 5a	only if c	l .		!			<u> </u>		eating	(65)
include (57 5. Internal of Metabolic gain)m in calo lains (see ns (Table Feb	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57 5. Internal g Metabolic gai	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal of Metabolic gai Jan (66)m= 140.43	m in calculations (see	culation of Table 5 (25), Wat Mar 140.43	of (65)m and 5a ts Apr 140.43	only if constant of the consta	ylinder is Jun 140.43	Jul 140.43	Aug 140.43	or hot w Sep 140.43	ater is fr	om com	munity h	eating	
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04	m in calcular man in calcular man (Table Feb 140.43 s (calcular 40.89	Table 5 2 Table 5 2 Table 5 3 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraints on the constraint on the constraints on the constraint on the constraints of the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint of	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains	m in calcular (see 140.43) m in calcular (see 140.43) s (calcular 40.89) m ins (calcular 140.89)	Table 5 2 Table 5 2 Table 5 3 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 4 Table 5 5 Table 5 4 Table 5 4 Table 5 5 Table 5 5 Table 5 6 Table 5 7 Table	of (65)m and 5a ts Apr 140.43 opendix 25.18	only if constraints only if constraints only if constraints on the constraint on the constraints of the constraints on the constraints on the constraints on the constraint on the constraints on the constraint on the constraints of the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint of	Jun 140.43 ion L9 o	Jul 140.43 r L9a), a	Aug 140.43 Iso see	Sep 140.43 Table 5 29.95	Oct 140.43	Nov	Dec	eating	(66)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances ga (68)m= 308.33	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Metabolic gain (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains	m in calcular (see 140.43) m in calcular (calcular 40.89) ains (calcular 311.53)	culation of Table 5 (a) Wat Mar 140.43 (b) 33.26 (c) culated in 303.47	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27	Jul 140.43 r L9a), a 17.17 13 or L1 230.67	Aug 140.43 lso see 22.32 3a), also	Sep 140.43 Table 5 29.95 see Ta 235.53	Oct 140.43 38.03 ble 5 252.7	Nov 140.43	Dec 140.43	eating	(66) (67)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal g Metabolic gai Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain	m in calculations (See Ins. (Table Feb 140.43) (Calculations (Calculations (Calculations) (Calcu	culation of Table 5 2 5), Wat Mar 140.43 ted in Ap 33.26 culated in 303.47 ated in A 51.38	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a)	Aug 140.43 Iso see 22.32 3a), also 227.47	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table	Oct 140.43 38.03 ble 5 252.7 5	Nov 140.43 44.39	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gain (69)m= 51.38 Pumps and fa	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculati	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m and 5a ts Apr 140.43 opendix 25.18 Appendix 286.3 opendix 51.38 5a)	only if construction only if c	Jun 140.43 ion L9 of 15.89 uation L 244.27 ion L15 51.38	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73	eating	(66) (67) (68)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial forms (70)m= 0 Losses e.g. e	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the culation of th	of (65)m s and 5a ts Apr 140.43 opendix 25.18 Append 286.3 opendix 51.38 sa) 0 tive valu	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5)	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47), also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38	Oct 140.43 38.03 ble 5 252.7 5 51.38	Nov 140.43 44.39 274.36	Dec 140.43 47.32 294.73 51.38	eating	(66) (67) (68) (69)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factorial from the second seco	min calculations (See Ins. (Table Feb. 140.43) (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ole 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70) (71)
include (57 5. Internal of Jan (66)m= 140.43 Lighting gains (67)m= 46.04 Appliances gains (68)m= 308.33 Cooking gains (69)m= 51.38 Pumps and factors (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	min calculations (See Ins. (Table Feb 140.43) s (calculations (Calculations) (Cal	culation of the Europe Solution of the Europe	of (65)m and 5a ts Apr 140.43 ppendix 25.18 Appendix 286.3 ppendix 51.38 5a) 0 tive valu -93.62	only if construction only if c	Jun 140.43 ion L9 o 15.89 uation L 244.27 ion L15 51.38 0 le 5) -93.62	Jul 140.43 r L9a), a 17.17 13 or L1 230.67 or L15a) 51.38	Aug 140.43 Iso see 22.32 3a), also 227.47 0, also se 51.38	Sep 140.43 Table 5 29.95 see Ta 235.53 ee Table 51.38 0 -93.62	Oct 140.43 38.03 ole 5 252.7 5 51.38 0 -93.62	Nov 140.43 44.39 274.36 51.38 0	Dec 140.43 47.32 294.73 51.38 0	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	X	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

									. ,			_					_
Southwe	<u> </u>	0.77	X	0.6	65	X	10	04.39			0.24	X	0.7		=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7		=	59.56	(79)
Southwe	est _{0.9x}	0.77	Х	0.6	55	X	9	2.85			0.24	X	0.7		=	7.03	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	6	9.27			0.24	X	0.7		=	44.43	(79)
Southwe	est _{0.9x}	0.77	X	0.6	65	x	6	9.27] [0.24	X	0.7		=	5.24	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	4	4.07			0.24	X	0.7		=	28.27	(79)
Southwe	est _{0.9x}	0.77	X	0.6	65	x	4	4.07			0.24	X	0.7		=	3.34	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	3	1.49			0.24	X	0.7		=	20.2	(79)
Southwe	est _{0.9x}	0.77	x	0.6	55	x	3	1.49			0.24	X	0.7		=	2.38	(79)
																	_
Solar ga	ains in wa	tts, ca	lculated	l for eac	h month				(83)m	= Su	ım(74)m .	(82)m				_	
(83)m=	45.33 8	3.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.0)5		(83)
Total ga	ains – inte	rnal a	nd solar	· (84)m =	= (73)m	+ (8	33)m	, watts					_				
(84)m=	622.79 65	56.94	684.4	712.62	729.21	7'	10.09	679.62	649.	.56	621.77	598.64	592.15	601.	12		(84)
7. Mea	an internal	temp	erature	(heating	season)											
	erature du			, ,		<i>'</i>	area f	from Tab	ole 9,	Th1	I (°C)					21	(85)
•	tion factor	_	•			_					` ,						」
Γ		Feb	Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	De	эс		
(86)m=	0.99	0.99	0.97	0.94	0.85	(0.67	0.5	0.5	Ť	0.78	0.94	0.98	0.9	9		(86)
Mean i	internal te	mner:	ature in	living ar	22 T1 (fo	مااد	w ste	ns 3 to 7	in T	ahle	, 9c)					ı	
(87)m=	1	0.15	20.35	20.61	20.84	_	0.97	20.99	20.9	_	20.92	20.66	20.31	20.0)3		(87)
L		I				<u> </u>			<u> </u>							I	` ,
· -	erature du 20	ring n	eating p	20.02	20.02	_	eiiing :0.03	20.03	20.0	_	20.03	20.02	20.01	20.0	14	1	(88)
(88)m=						<u> </u>			L	03	20.03	20.02	20.01	20.0	,,		(00)
г	tion factor	~~				- 			<u> </u>							1	
(89)m=	0.99).98	0.97	0.92	0.8		0.59	0.4	0.4	4	0.71	0.92	0.98	0.9	9		(89)
Mean_i	internal te	mpera	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)					
(90)m=	18.76 1	8.91	19.19	19.57	19.87	2	0.01	20.03	20.0	03	19.97	19.64	19.15	18.7	73		(90)
											f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean i	internal te	mpera	ature (fo	r the wh	ole dwe	llin	g) = fl	_A × T1	+ (1 -	– fL	A) × T2						
(92)m=	19.09 1	9.24	19.49	19.85	20.12	2	0.26	20.28	20.2	28	20.22	19.91	19.46	19.0)7		(92)
Apply	adjustmer	nt to th	ne mean	interna	temper	atu	re fro	m Table	4e, \	whe	re appro	priate				_	
(93)m=	19.09 1	9.24	19.49	19.85	20.12	2	0.26	20.28	20.2	28	20.22	19.91	19.46	19.0)7		(93)
8. Spa	ce heating	g requ	iirement														
	to the me			•		ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	:(76)m an	d re-	calc	culate	
the util	lisation fac					1							1			1	
		Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	De	ec_		
(94)m=	tion factor	or ga 0.98	0.96	0.91	0.81	Γ,	0.61	0.42	0.4	7	0.72	0.92	0.97	0.9	<u> </u>	1	(94)
· · ·	gains, hm					Г,	J.0 I	0.42	0.4	'	0.72	0.92	0.97	0.3			(0 1)
		12.13	657.44	651.26	587.23	4:	31.69	288.54	302.	43	449.1	548.84	575.78	593.	05		(95)
	ly average					_		L				5.5	1 3.0.70	1 230.		I	V = 7
(96)m=		4.9	6.5	8.9	11.7	_	14.6	16.6	16.	4	14.1	10.6	7.1	4.2	2		(96)
_	oss rate fo	r mea				_						1		<u> </u>		I	
_	1205.77 11		1053.8	876.6	672.69		46.3	290.31	305.		484.96	743.42	992.13	1199	.96		(97)
· L		!								!			-			1	

Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m= 441.04	351.72	294.89	162.24	63.58	0	0	0	0	144.77	299.77	451.54		
							Tota	l per year	(kWh/year) = Sum(9	08)15,912 =	2209.56	(98)
Space heatin	g require	ement in	kWh/m²	/year								29.83	(99)
8c. Space co	oling red	quiremen	nt								_		
Calculated fo	r June, c	July and	August.	See Tal	ble 10b			•		•			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate						1	ì				-		(100)
(100)m= 0 Utilisation fac	0	0	0	0	741.37	583.63	597.87	0	0	0	0		(100)
$\frac{\text{(101)m}}{\text{m}} = 0$	0	0	0	0	0.85	0.92	0.89	0	0	0	0		(101)
Useful loss, h						0.02	0.00						` ,
(102)m= 0	0	0	0	0	628.97	534.61	533.86	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)					
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space cooling					dwelling,	continu	ous (kW	h') = 0.0)24 x [(10	03)m – (102)m]x	(41)m	
set (104)m to (104)m= 0	2ero II (104)m <	0	0	88.58	137.36	110.8	0	0	0	0		
(101)					00.00	107.00	110.0	<u> </u>	I = Sum(<u> </u>	= +	336.73	(104)
Cooled fraction	า								cooled	,	4) =	0.6	(105)
Intermittency f	actor (Ta	able 10b)										
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
Space cooling	roquiror	mont for	month -	(104)m	v (10E)	·· (106)	~	Tota	I = Sum((104)	= [0	(106)
(107)m= 0	0	0	0	0	13.31	20.63	16.64	0	0	0	0		
,		l			<u> </u>	<u> </u>	l	L Tota	I I = Sum(<u>1.07)</u>	=	50.58	(107)
Space cooling	requirer	ment in k	(Wh/m²/\	/ear) ÷ (4) =	,		0.68	(108)
9b. Energy red	<u> </u>				scheme)			, , ,		L		
This part is use	•		Ţ,	Ŭ			ting prov	ided by	a comm	unity scl	neme		_
Fraction of spa	ace heat	from se	condary,	supplen/	nentary I	heating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so includes boilers, h									up to four	other heat	sources; th	e latter	_
Fraction of hea	at from C	Commun	ity CHP									0.13	(303a)
Fraction of cor	nmunity	heat fro	m heat s	ource 2							Ī	0.87	(303b)
Fraction of total	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	ia) =	0.13	(304a)
Fraction of total	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	(sb) =	0.87	(304b)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem		ŗ	1	(305)
Distribution los	s factor	(Table 1	2c) for (commun	ity heatiı	ng syste	m				ŗ	1.05	(306)
Space heating	9										L	kWh/yea	r
Annual space	heating	requirem	nent									2209.56	
Space heat fro	m Com	munity C	HP					(98) x (3	04a) x (30	5) x (306)	=	301.6	(307a)

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	2018.43	(307b)
Efficiency of secondary/supplementary heating	system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/sup	plementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2063.55	7
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x (305) x (306) =	281.67	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =	44.87	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling system	, if not enter 0)	= (107) ÷ (314) =	10.71	(315)
Electricity for pumps and fans within dwelling (T mechanical ventilation - balanced, extract or po-	•	e	158.57	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Appendix L)			325.25	(332)
Electricity generated by PVs (Appendix M) (neg	ative quantity)		-158.19	(333)
Electricity generated by wind turbine (Appendix	M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Appendix 10b. Fuel costs – Community heating scheme	M) (negative quantity)		0	(334)
	M) (negative quantity) Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	(334)
	Fuel		Fuel Cost	(334) (340a)
10b. Fuel costs – Community heating scheme	Fuel kWh/year	(Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scheme Space heating from CHP	Fuel kWh/year (307a) x	(Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58	(340a) (340b)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37	(340a) (340b) (342a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2 Water heating from CHP	Fuel kWh/year (307a) x (307b) x (310a) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37	(340a) (340b) (342a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37 79.93	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37 79.93	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37 79.93 1.41 20.92	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97	Fuel Cost £/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	(Table 12) 2.97 4.24 2.97 4.24 2.97 4.24 * 0.01 = 4.24 * 0.01 = Fuel Price 13.19 13.19 * 0.01 = 13.19 * 0.01 =	Fuel Cost £/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	(Table 12) 2.97 4.24 2.97 4.24 2.97 4.24 * 0.01 = 4.24 * 0.01 = Fuel Price 13.19 13.19 * 0.01 = 13.19 * 0.01 =	Fuel Cost £/year 8.96 85.58 8.37 79.93 1.41 20.92 42.9 120 -20.87	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0)] =		1.22	(357)
SAP rating (section12)				82.91	(358)
12b. CO2 Emissions – Community	heating scheme				_
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	478.74 ×	0.22	103.41	(363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	146.49 ×	0.52	-76.03	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.22	96.57	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	0.52	-71.01	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	[(307b))+(310b)] x 100 ÷ (367b) x	0.22	= 871.93	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 23.29	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	72)	948.16	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantar	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	nd water heating	(373) + (374) + (375) =		948.16	(376)
CO2 associated with space cooling	J	(315) x	0.52	= 5.56	(377)
CO2 associated with electricity for	pumps and fans within dwe	lling (331)) x	0.52	= 82.3	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 168.8	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applie	cable	0.52 × 0.01 =	-82.1	(380)
Total CO2, kg/year	sum of (376)(382) =			1122.71	(383)
Dwelling CO2 Emission Rate	te (383) ÷ (4) =			15.16	(384)
El rating (section 14)				87.36	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit		_		63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Space heating from CHP)	$(307a) \times 100 \div (362) =$	478.74 ×	1.22	584.06	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	146.49 ×	3.07	-449.74	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	1.22	545.46	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	136.81 ×	3.07	-420.02	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	= 4924.77	(368)
Electrical energy for heat distribution	on	[(313) x		137.74	(372)

Total Energy associated with community systems	(363)(366) + (368)(372	2)	=	5322.28	(373)
if it is negative set (373) to zero (unless specified otherwise	e, see C7 in Appendix C)		5322.28	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or insta	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			5322.28	(376)
Energy associated with space cooling	(315) x	3.07	=	32.87	(377)
Energy associated with electricity for pumps and fans within o	dwelling (331)) x	3.07	=	486.81	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	998.51	(379)
Energy saving/generation technologies					1
Item 1		3.07 × 0.01	= _	-485.65	(380)
Total Primary Energy, kWh/year sum of (376	6)(382) =			6354.82	(383)

			llser F	Details:						
Assessor Name:	Chris Hockne	ااه	0001 E		a Num	hori		STD()	016363	
Software Name:	Stroma FSA				a Num are Vei				on: 1.0.4.10	
		F	roperty	Address						
Address :										
1. Overall dwelling dime	ensions:									
Danamant				a(m²)	l., ,		ight(m)	1,- ,	Volume(m³)	_
Basement				76.06	(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1c	d)+(1e)+(1ı	n)	76.06	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	(3n) =	197.76	(5)
2. Ventilation rate:										
	main heating	secondar heating	ry	other		total			m³ per hou	r
Number of chimneys	0	+ 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	7 + 7	0	- -	0	x	20 =	0	(6b)
Number of intermittent fa	ıns					0	x -	10 =	0	(7a)
Number of passive vents	;				F	0	x -	10 =	0	 (7b)
Number of flueless gas f					F	0	X 4	40 =	0	(7c)
realiser of fideless gas in					L				0	(/'C)
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fan	s = (6a) + (6b) + (7a)	7a)+(7b)+((7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	een carried out or is	intended, procee	d to (17),	otherwise o	continue fr	om (9) to (
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0 if both types of wall are p					•	uction			0	(11)
deducting areas of openi	·	, ,	Tile great	ici wan arc	a (anoi					
If suspended wooden	floor, enter 0.2 (u	unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	·								0	(13)
Percentage of window	s and doors drau	ught stripped		0.05 (0.0) (4 4) 4	1001			0	(14)
Window infiltration				0.25 - [0.2]	. ,	100] = 12) + (13) -	ı (15) —		0	= (15)
Infiltration rate Air permeability value,	a50 everessed	in cubic metre	se nar ha					area	0	(16)
If based on air permeabil	•			•	•	elle oi e	ilvelope	aica	0.15	(17)
Air permeability value applie	-					is being u	sed		0.10	()
Number of sides sheltered	ed								3	(19)
Shelter factor					[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorpora	•			(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified f		.		1.		 _	·		1	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp									1	
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25		1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effec		-	rate for t	he appli	cable ca	se							
If mechanica				(.=	. (22)	\		إ	0.5	(23a
If exhaust air h) = (23a)		Į	0.5	(23b
If balanced with		-	-	_							L	76.5	(230
a) If balance	1			i —	1							÷ 100]	.
(24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(24a
b) If balance	1			i		<u> </u>	r ``	``	 				,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h if (22b)n	nouse ex n < 0.5 ×								5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n	ventilation			•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er) or (24k	o) or (24	c) or (24	d) in box	(25)	-		-		
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losse	s and he	at loss i	narameti	≏r.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/ł	()	k-value kJ/m²-k		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1.	/[1/(1.2)+	0.04] =	4.52	=			(27)
Windows Type	e 3				5.51	x1.	/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type	e 4				0.65		/[1/(1.2)+	0.04] =	0.74	=			(27)
Walls Type1	38.1	4	20.58	8	17.56	=			2.63	=		¬	(29)
Walls Type2	23.9		2.6		21.32	=	0.15	-	3.2	룩 ¦		╡╠	(29)
Walls Type3				_		_		=		- 		╡╠	(29)
Walls Types Walls Type4	5.9		0	=	5.95	×	0.15	=	0.89	북 ¦		╡╠	=
Roof	29.5		0	_	29.51	=	0.15	=	4.43	_		╡	(29)
NUUI	1 00 4				20.45	5 X	0.15	=	3.07			_	(30)
	20.4		0			=							
Total area of e	L		0		117.9	_						- —	`
Total area of e Party wall	L					_	0	= [0	_ [] [(32)
Total area of e Party wall Party floor	L				117.9	×	0	= [0				(32)
Total area of e Party wall Party floor Party ceiling	elements	, m²			117.9 12.35 76.06 55.61	x] []]			(32)
Total area of e Party wall Party floor Party ceiling * for windows and	elements	, m²	effective wi		117.9 12.35 76.06 55.61	x				[[s given in	paragraph	3.2	(32)
Total area of e Party wall Party floor Party ceiling * for windows and ** include the area	elements I roof winde	, m² ows, use e sides of in	effective wi		117.9 12.35 76.06 55.61	x ated using	ı formula 1	/[(1/U-valu		[[s given in	paragraph		(32) (32) (32)
Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los	elements I roof winde as on both ss, W/K =	ows, use e sides of in	effective wi		117.9 12.35 76.06 55.61	x ated using		/[(1/U-valu) + (32) =	ıe)+0.04] a		[40.9	(32) (32) (32) (32)
Total area of e Party wall Party floor Party ceiling * for windows and	elements I roof winder as on both as, W/K = Cm = S(ows, use e sides of in = S (A x (A x k)	effective wi nternal wall U)	ls and par	117.9 12.35 76.06 55.61 alue calcul titions	x x	ı formula 1	/[(1/U-valu) + (32) = ((28)		?) + (32a).	[(31) (32) (32) (32) (32) (33) (34) (35)

can be used inste	ead of a de	tailed calci	ulation.										
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix I	K						23.27	(36)
if details of therm	,	,			•								` ′
Total fabric he	eat loss							(33) +	(36) =			64.17	(37)
Ventilation he	at loss ca	alculated	monthly	У				(38)m	= 0.33 × (25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	80.13	(39)
(40)m= 1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
Number of da	ys in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.05	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
	•		•	•	•	•	•		•	•	•	•	
4. Water hea	iting ene	rgy requi	irement:								kWh/y	ear:	
												1	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.38		(42)
Annual average	•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).82	1	(43)
Reduce the annu	_				_	_	to achieve	a water us	se target o	f		J	
not more that 125				aler use, r	ioi and co	•	1		<u> </u>		1	1	
Jan Hot water usage	Feb	Mar	Apr	May	Jun	Jul Toble 10 Y	Aug	Sep	Oct	Nov	Dec		
	· ·		i	· 			· <i>′</i>					1	
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	4000.0	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
				_					Total = Su	m(45) ₁₁₂ =	-	1428.9	(45)
If instantaneous v	vater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	•			•	
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storage Storage volun		includin	na anv sa	olar or M	/WHRS	storana	within sa	ame ves	امء		0	1	(47)
If community I	, ,		•			_		arric ves	301		U]	(47)
Otherwise if n	_			-			. ,	ers) ente	er '0' in (47)			
Water storage			(1)					, ,	(,			
a) If manufac	turer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Temperature	factor fro	m Table	2b								0]	(49)
Energy lost fro		_	-				(48) x (49)) =		1	10		(50)
b) If manufac			-									- 1	<i>,</i> .
Hot water stor If community I	_			e∠(KVV	ri/litre/da	ay)				0.	.02]	(51)
Volume factor	_		UII 7.U							1	.03	1	(52)
Temperature			2b								0.6	1	(53)

Chargy lost from water	r otorogo	Id Mile /s d	205			(47) v (E4)) v (EQ) v (I	E0)			1	(5.4)
Energy lost from wate Enter (50) or (54) in (•	, KVVII/yt	zai			(47) X (51)) x (52) x (53) =		.03		(54) (55)
Water storage loss ca	,	or each	month			((56)m = ((55) × (41)r	m	1.	.03		(55)
	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
(56)m= 32.01 28.92 If cylinder contains dedicate											 ix H	(30)
(57)m= 32.01 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
` '		T 11							ļ	<u> </u>		(58)
Primary circuit loss (as Primary circuit loss ca	,			50\m - i	(58) <u>+</u> 36	S5 ~ (/11)	ım			0		(30)
(modified by factor f			`	,	` '	` '		r thermo	stat)			
(59)m= 23.26 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m			ı		l	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required for	r water he	eating ca	alculated	l for eac	h month	(62)m =	: 0.85 × (′45)m +	 (46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input calculated	l using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	l	
(add additional lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water hea	ater				!		•			•	•	
(64)m= 203.42 179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
						Outp	out from wa	ater heate	r (annual)₁	12	2079.74	(64)
Heat gains from water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	nl + 0.8 x	(146)m	+ (57)m	+ (59)m	1	_
						. (.)	.,	ι (. Ο /	. (0.)	()	1	
(65)m= 93.48 83.02	88.68	81.55	81.41	74.89	73.96	78.35	77.33	84.47	86.72	91.93	1	(65)
(65)m= 93.48 83.02 include (57)m in cal				<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
	culation o	of (65)m	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see	culation of	of (65)m and 5a	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal	culation of	of (65)m and 5a	only if c	<u> </u>	73.96	78.35	77.33	84.47	86.72	91.93		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table	culation of the Table 5	of (65)m and 5a	only if c	ylinder i	73.96 s in the o	78.35 dwelling	77.33 or hot w	84.47 ater is fr	86.72 rom com	91.93 munity h		(65)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb	culation of Earth Culation of	of (65)m and 5a ts Apr 143.03	only if c : : : : : : : : : : : : : : : : : : :	Jun 143.03	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03	culation of Earth Culation of	of (65)m and 5a ts Apr 143.03	only if c : : : : : : : : : : : : : : : : : : :	Jun 143.03	73.96 s in the 0	78.35 dwelling Aug 143.03	77.33 or hot w Sep 143.03	84.47 ater is fr	86.72 rom com	91.93 munity h		
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate)	e Table 5 e 5), Wat Mar 143.03 ated in Ap	of (65)m and 5a ts Apr 143.03 ependix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	73.96 s in the o Jul 143.03 r L9a), a	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculated) (67)m= 47.03 41.77	e Table 5 e 5), Wat Mar 143.03 ated in Ap	of (65)m and 5a ts Apr 143.03 ependix 25.72	only if construction in the construction in th	Jun 143.03 ion L9 o	73.96 s in the o Jul 143.03 r L9a), a	Aug 143.03 lso see 22.8	77.33 or hot w Sep 143.03 Table 5 30.6	84.47 ater is fr Oct 143.03	86.72 rom com Nov 143.03	91.93 munity h		(66)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate)	culation of the culture of the cultu	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if c May 143.03 L, equati 19.22 dix L, eq 270.31	Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is from Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21	culation of the culture of the cultu	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44	only if c May 143.03 L, equati 19.22 dix L, eq 270.31	Jun 143.03 ion L9 o 16.23 uation L 249.51	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58	84.47 ater is from Oct 143.03 38.85 ble 5 258.11	86.72 rom com Nov 143.03	91.93 munity h Dec 143.03		(66) (67)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69	culation of the culation of th	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula	culation of the culation of th	of (65)m and 5a ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69	only if c May 143.03 L, equati 19.22 dix L, eq 270.31 L, equat	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34 , also se	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5	86.72 rom com Nov 143.03 45.34	91.93 munity h Dec 143.03 48.34		(66) (67) (68)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains	culation of the culation of th	of (65)m and 5a ts Apr 143.03 ependix 25.72 Appendix 292.44 ependix 51.69 5a) 0	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a; 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 com com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0	culation of the culation of th	of (65)m and 5a ts Apr 143.03 ependix 25.72 Appendix 292.44 ependix 51.69 5a) 0	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69	73.96 s in the of Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a; 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 com com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation	culation of the culation of th	of (65)m ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calculate) (67)m= 47.03 41.77 Appliances gains (calculate) (68)m= 314.94 318.21 Cooking gains (calculate) (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation (71)m= -95.35 -95.35	culation of the culation of th	of (65)m ts Apr 143.03 opendix 25.72 Appendix 292.44 opendix 51.69 5a) 0 tive valu	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tal 240.58 ee Table 51.69	84.47 ater is from Oct 143.03 38.85 ble 5 258.11 5 51.69	86.72 rom com Nov 143.03 45.34 280.24 51.69	91.93 munity h Dec 143.03 48.34 301.04		(66) (67) (68) (69) (70)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatic (71)m= -95.35 -95.35 Water heating gains (culation of the English Coulation of the English Coulation of the English Coulated in Application Application Application Application Application Application Application Application (Table 5 of the English Coulation Applic	of (65)m and 5a ts Apr 143.03 ependix 25.72 Append 292.44 ependix 51.69 6a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 o see Table 240.58 ee Table 51.69 0	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains ((72)m= 125.65 123.55	culation of the English Coulation of the English Coulation of the English Coulated in Application Application Application Application Application Application Application Application (Table 5 of the English Coulation Applic	of (65)m and 5a ts Apr 143.03 ependix 25.72 Append 292.44 ependix 51.69 6a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 ion L15 51.69 0 le 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0	77.33 or hot w Sep 143.03 Table 5 30.6 see Tal 240.58 ee Table 51.69 0 -95.35	84.47 ater is fr Oct 143.03 38.85 ble 5 258.11 5 51.69 0 -95.35	86.72 om com Nov 143.03 45.34 280.24 51.69 0	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)
include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 143.03 143.03 Lighting gains (calcula (67)m= 47.03 41.77 Appliances gains (calcula (68)m= 314.94 318.21 Cooking gains (calcula (69)m= 51.69 51.69 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -95.35 -95.35 Water heating gains ((72)m= 125.65 123.55 Total internal gains =	culation of the cultivation of t	of (65)m and 5a ts Apr 143.03 ppendix 25.72 Appendix 51.69 5a) 0 tive valu -95.35	only if construction only if c	Jun 143.03 ion L9 o 16.23 uation L 249.51 cion L15 51.69 0 lle 5) -95.35	73.96 s in the o Jul 143.03 r L9a), a 17.54 13 or L1 235.61 or L15a) 51.69 0 -95.35	78.35 dwelling Aug 143.03 lso see 22.8 3a), also 232.34), also se 51.69 0 -95.35	77.33 or hot w Sep 143.03 Table 5 30.6 o see Tall 240.58 ee Table 51.69 0 -95.35	84.47 ater is from the second of the second	86.72 rom com Nov 143.03 45.34 280.24 51.69 0 -95.35 120.45 1)m + (72)	91.93 munity h Dec 143.03 48.34 301.04 51.69 0 -95.35		(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast 0.9x	0.77	x	3.95	x	11.28	x	0.24	х	0.7	=	10.38	(75)
Northeast 0.9x	0.77	x	3.26	x	22.97	x	0.24	х	0.7	=	17.43	(75)
Northeast 0.9x	0.77	x	3.95	x	22.97	x	0.24	х	0.7	=	21.12	(75)
Northeast 0.9x	0.77	x	3.26	x	41.38	X	0.24	х	0.7	=	31.41	(75)
Northeast 0.9x	0.77	x	3.95	x	41.38	x	0.24	х	0.7	=	38.06	(75)
Northeast 0.9x	0.77	x	3.26	x	67.96	x	0.24	х	0.7	=	51.58	(75)
Northeast 0.9x	0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast 0.9x	0.77	x	3.26	x	91.35	x	0.24	х	0.7	=	69.34	(75)
Northeast 0.9x	0.77	x	3.95	x	91.35	X	0.24	х	0.7	=	84.02	(75)
Northeast 0.9x	0.77	x	3.26	x	97.38	X	0.24	х	0.7	=	73.92	(75)
Northeast 0.9x	0.77	x	3.95	x	97.38	x	0.24	х	0.7	=	89.57	(75)
Northeast 0.9x	0.77	x	3.26	x	91.1	x	0.24	х	0.7	=	69.15	(75)
Northeast 0.9x	0.77	x	3.95	x	91.1	x	0.24	х	0.7	=	83.79	(75)
Northeast 0.9x	0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast 0.9x	0.77	x	3.95	x	72.63	x	0.24	x	0.7] =	66.8	(75)
Northeast 0.9x	0.77	x	3.26	x	50.42	x	0.24	x	0.7] =	38.27	(75)
Northeast 0.9x	0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast 0.9x	0.77	x	3.26	x	28.07	x	0.24	х	0.7	=	21.31	(75)
Northeast 0.9x	0.77	x	3.95	x	28.07	x	0.24	х	0.7	=	25.81	(75)
Northeast 0.9x	0.77	x	3.26	x	14.2	x	0.24	х	0.7	=	10.78	(75)
Northeast 0.9x	0.77	x	3.95	x	14.2	x	0.24	х	0.7	=	13.06	(75)
Northeast 0.9x	0.77	x	3.26	x	9.21	X	0.24	х	0.7	=	6.99	(75)
Northeast 0.9x	0.77	x	3.95	x	9.21	X	0.24	х	0.7	=	8.47	(75)
Southwest _{0.9x}	0.77	x	5.51	x	36.79		0.24	х	0.7	=	23.6	(79)
Southwest _{0.9x}	0.77	x	0.65	x	36.79		0.24	х	0.7	=	2.78	(79)
Southwest _{0.9x}	0.77	x	5.51	x	62.67]	0.24	х	0.7	=	40.2	(79)
Southwest _{0.9x}	0.77	x	0.65	x	62.67]	0.24	х	0.7	=	4.74	(79)
Southwest _{0.9x}	0.77	x	5.51	x	85.75]	0.24	x	0.7	=	55.01	(79)
Southwest _{0.9x}	0.77	x	0.65	x	85.75]	0.24	х	0.7	=	6.49	(79)
Southwest _{0.9x}	0.77	x	5.51	x	106.25]	0.24	х	0.7	=	68.16	(79)
Southwest _{0.9x}	0.77	x	0.65	x	106.25]	0.24	х	0.7	=	8.04	(79)
Southwest _{0.9x}	0.77	x	5.51	x	119.01		0.24	х	0.7	=	76.34	(79)
Southwest _{0.9x}	0.77	x	0.65	x	119.01		0.24	х	0.7	=	9.01	(79)
Southwest _{0.9x}	0.77	x	5.51	x	118.15]	0.24	х	0.7	=	75.79	(79)
Southwest _{0.9x}	0.77	x	0.65	x	118.15		0.24	х	0.7	=	8.94	(79)
Southwest _{0.9x}	0.77	X	5.51	x	113.91]	0.24	х	0.7	j =	73.07	(79)
Southwest _{0.9x}	0.77	X	0.65	x	113.91		0.24	x	0.7] =	8.62	(79)
Southwest _{0.9x}	0.77	X	5.51	x	104.39]	0.24	x	0.7] =	66.97	(79)
												_

Southwe	est _{0.9x}	0.77	x	0.6	35	X	10	04.39			0.24	x	0.7	=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	X	9	2.85]		0.24	x [0.7		59.56	(79)
Southwe	est _{0.9x}	0.77	x	0.6	S5	x	9	2.85			0.24	x	0.7		7.03	(79)
Southwe	est _{0.9x}	0.77	x	5.5	51	x	6	9.27			0.24	x [0.7		44.43	(79)
Southwe	est _{0.9x}	0.77	х	0.6	65	x	6	9.27			0.24	x [0.7	=	5.24	(79)
Southwe	est _{0.9x}	0.77	Х	5.5	51	X	4	4.07			0.24	x [0.7		28.27	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	4	4.07			0.24	х	0.7		3.34	(79)
Southwe	est _{0.9x}	0.77	х	5.5	51	x	3	1.49			0.24	_ x [0.7		20.2	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	3	31.49			0.24	×	0.7	<u> </u>	2.38	(79)
	_					•										
Solar ga	ains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total ga	ains – ir	nternal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts							_	
(84)m=	632.31	666.4	693.47	721.08	737.03	71	17.34	686.56	656	6.6	629.18	606.65	600.84	610.35	5	(84)
7. Mea	an inter	nal tem	perature	(heating	season)										
			neating p	`		<i>'</i>	area f	from Tab	ole 9.	, Th	1 (°C)				21	(85)
•		J	ains for I			•			,	,	()					`
Γ	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	:	
(86)m=	0.99	0.99	0.97	0.94	0.85	().67	0.5	0.5	Ť	0.78	0.94	0.98	0.99	7	(86)
Mooni	intorna	Ltompor	ature in	living or	oo T1 /f/	مالد	w cto	nc 2 to 7	I 7 in T	I	. 00)		1	1		
(87)m=	20.08	20.18	20.37	20.63	20.85	_	0.97	20.99	20.9	_	20.93	20.67	20.34	20.06	٦	(87)
L									<u> </u>	I			1 20.0			(- /
· -			neating p		·	_		1		$\overline{}$	<u> </u>	00.04	1 00 04		¬	(00)
(88)m=	20.02	20.03	20.03	20.04	20.04		0.05	20.05	20.0	05	20.05	20.04	20.04	20.03		(88)
Utilisat	tion fac	tor for g	ains for i	rest of d	welling,	h2,	m (se	e Table	9a)						_	
(89)m=	0.99	0.98	0.97	0.92	0.8	C	0.59	0.4	0.4	14	0.7	0.92	0.98	0.99		(89)
Mean i	interna	l temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m=	18.82	18.97	19.24	19.61	19.9	2	0.03	20.05	20.0	05	19.99	19.68	19.2	18.79		(90)
_											f	LA = Liv	ng area ÷ (4) =	0.26	(91)
Mean i	interna	l temper	ature (fo	r the wh	ole dwe	llind	a) = fl	LA x T1	+ (1	– fL	A) x T2					
(92)m=	19.14	19.28	19.53	19.87	20.14		0.27	20.29	20.2		20.23	19.93	19.49	19.12	7	(92)
Apply :	adjustn	nent to t	he mean	interna	l temper	<u> </u>	re fro	m Table	4e,	whe	re appro	priate	ļ		_	
(93)m=	19.14	19.28	19.53	19.87	20.14	2	0.27	20.29	20.2	29	20.23	19.93	19.49	19.12	7	(93)
8. Spa	ice hea	ting requ	uirement						<u> </u>							
Set Ti	to the r	mean int	ternal ter	nperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the util	lisation	factor fo	or gains	using Ta	ble 9a	_		i	ı						_	
L	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	:	
			ains, hm										1	l	¬	(0.1)
(94)m=	0.98	0.98	0.96	0.91	0.8	(0.61	0.42	0.4	16	0.72	0.92	0.97	0.99		(94)
			W = (94)	<u> </u>		1 4	040	000.40	004	40	450.44	550.00	T 504.40	000.0	. 7	(OF)
` ' L	622.58	651.67	666.51	659.26	592.98	<u> </u>	34.6	290.12	304	.19	453.11	556.23	584.49	602.37		(95)
	ly avera	age exte	rnal tem		11.7	_		16.6	16	<u>, I</u>	1/1	10.6	7 1	4.2	7	(96)
(96)m=			6.5	8.9	<u> </u>	Ь_	14.6	16.6	16.		14.1	10.6	7.1	4.2	_	(30)
			an intern	·	675.13	_	, VV = 48.18	=[(39)m] 291.7	x [(9.	_ _	- (96)m 486.99] 746.49	996.1	1204.4	8	(97)
(07)111-	.200.07	1100.00	1007.27	0,0.00	070.10		.0.10	201.7	L 300	., 0	-50.33	70.49	330.1	1 1204.4	<u> </u>	(3.)

Space heating requirement in kWh/m²/year Scale S	Space heating	ng require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
Space heating requirement in kWh/m²/year Space S	(98)m= 436.8	347.88	290.73	158.85	61.12	0	0	0	0	141.56	296.36	447.97		
Second S								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2181.26	(98)
Calculated for June, July and August, See Table 10b	Space heating	ng require	ement in	kWh/m²	² /year								28.68	(99)
Space cooling requirement for month, whole develling, continuous (kWh) = 0.024 x [(103)m - (102)m 0 0 0 0 0 0 0 0 0	8c. Space co	oling rec	quiremen	nt										
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10	Calculated for	r June, c	July and	August.	See Tal	ble 10b		1	·	1	·			
Description Description				<u> </u>					<u> </u>					
Utilisation factor for loss hm						· ·	1	ì				$\overline{}$		(100)
Useful loss, hmLm (Watts) = (100)m × (101)m 0 0 0 0 0 0 0 0 0	` '	1			0	743.01	304.92	399.29	0			0		(100)
Gains (solar gains calculated for applicable weather region, see Table 10) Gains (solar gains calculated for applicable weather region, see Table 10) (103)m=		1		0	0	0.85	0.92	0.9	0	0	0	0		(101)
Gains (solar gains calculated for applicable weather region, see Table 10) (103)m 0 0 0 0 0 0 759.25 726.17 889.83 0 0 0 0 0 0 (Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m (104)m 10 zero if (104)m < 3 x (98)m (104)m 0 0 0 0 0 89.76 139.66 112.76 0 0 0 0 (105)m 0 0 0 0 0 89.76 139.66 112.76 0 0 0 0 (106)m 0 0 0 0 0 0 0 0 0.25 0.25 0.25 0.25 0 0 0 0 (106)m 0 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0 0 (106)m 0 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 (106)m 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 0 (107)m 0 0 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 0 (108)b Energy requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) (108)b Energy requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from community system 1 - (301) = 1 (302) (303) = 0.13 (303) (303) = 0.13 (303) (303) = 0.13 (303) (303) = 0.13 (303) (303) (303) = 0.13 (303) (3	` ′	nmLm (V	vatts) = ((100)m x	(101)m	<u>!</u>	ļ	ļ		ļ				
103 m		- `		` 	` 	1	538.46	538.26	0	0	0	0		(102)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m 04)m	Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	•				
Set (104)m to zero if (104)m < 3 × (98)m	(/			<u> </u>	<u> </u>	l	l	l						(103)
104 m	•	•				dwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	(41)m	
Total = Sum(1,04) = 342.18 (104) f C = cooled area ÷ (4) = 0.59 (105) ntermittency factor (Table 10b) 106)m = 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0 0 Space cooling requirement for month = (104)m × (105) × (106)m 107)m = 0 0 0 0 0 13.13 20.43 16.49 0 0 0 0 Total = Sum(1,04) = 0 (106) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter necludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304) Fraction of total space heat from Community Heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heating system 1 (305) Space heating Annual space heating requirement	` —				Í	89.76	139.66	112.76	0	0	0	0		
Intermittency factor (Table 10b) Intermittency factor (Table 10b)	` ′					ļ	ļ	ļ	Tota	l = Sum(1 <u>04)</u>	=	342.18	(104)
Total = Sum(104) = 0 0 0 0 0 0 0 0 0	Cooled fractio	n							f C =	cooled	area ÷ (4	4) =	0.59	(105)
Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(104) = 0 (106) Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(107) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter raction of heat from Community CHP (302) × (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heating system (305a) Fraction of space heating method (Table 4c(3)) for community heating system (305a) Fraction of community requirement (305a)		- `		i –		1	1	1	<u> </u>	1	<u> </u>			
Space cooling requirement for month = (104)m × (105) × (106)m Total = Sum(1,07) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter raction of heat from Community CHP (302) × (303a) = 0.13 (303a) Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304a) Fraction of space heat from community heating system 1.05 (306a) Fraction of space heating method (Table 4c(3)) for community heating system 1.05 (306a) Fraction of space heating requirement 2 (306a)	(106)m= 0	0	0	0	0	0.25	0.25	0.25	l	l	l	<u> </u>		7(400)
Total = Sum(107) = 50.05 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 50.05 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter ractudes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) × (303a) = 0.13 (303) Fraction of total space heat from Community heat source 2 (302) × (303a) = 0.13 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of space heat from community heat source 2 (302) × (303b) = 0.87 (304)	Space cooling	ı requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	rota	i = Surri(1 <u>U4</u>)	= [0	(106)
Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.66 (108) Space cooling requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) Fraction of space heat from community system 1 — (301) = 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter recludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP (302) × (303a) = 0.13 (304) Fraction of total space heat from Community CHP (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304) Fraction of control and charging method (Table 4c(3)) for community heating system 1 (305) Fraction of control and charging method (Table 4c(3)) for community heating system 1.05 (306) Fraction of control and charging method (Table 4c(3)) for community heating system 1.05 (306)	· —	 			` 	- ` 	``		0	0	0	0		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 1 (302) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 1 (302) Fraction of total space heat from Community CHP 2 (302) x (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heat source 2 (302) x (303b) = 0.87 (304b) Fraction of total space heat from community heating system 1 (305) Fraction of total space heat from community heating system 1.05 (306b)		•							Tota	l = Sum(107)	=	50.05	(107)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301) The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP 1 (302) Fraction of total space heat from Community CHP 2 (302) x (303a) = 3 (304x 3 (304x 3 (305x) = 4 (305x) 5 (306x) 6 (306x)	Space cooling	requirer	ment in k	kWh/m²/y	/ear				(107) ÷ (4) =		Ī	0.66	(108)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none [7] The community system 1 – (301) = [7] The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP [7] Fraction of community heat from heat source 2 [8] Fraction of total space heat from Community CHP [8] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heat source 2 [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heating method (Table 4c(3)) for community heating system [9] Graction of total space heating requirement [9] Graction of total space heating requirement [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space heat from community heating system [9] Graction of total space	9b. Energy re	quiremer	nts – Cor	mmunity	heating	scheme)							
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recludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 1.05 Space heating KWh/year 2181.26	Fraction of sp	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from Community heat source 2 (302) × (303b) = 0.87 (304b) (305) Oistribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement	-									up to four	other heat	sources; th	e latter	
Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) (305) Fraction of total space heat from Community heat source 2 (302) × (303b) = 1 (305) (306) Space heating Annual space heating requirement			-		aste neat t	rom powe	r stations.	See Appei	naix C.			Г	0.13	(303a
Fraction of total space heat from Community CHP (302) × (303a) = 0.13 (304a) Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304b) Fractor for control and charging method (Table 4c(3)) for community heating system 1 (305) Space heating Annual space heating requirement (302) × (303a) = 0.13 (304a) (304a) (302) × (303b) = 0.87 (304b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (305) × (305) × (305b) = 0.87 (305b) (306) × (307) × (307) × (305b) = 0.87 (305b) (307) × (30				•	ourco 2							L T		Ⅎ`
Fraction of total space heat from community heat source 2 (302) × (303b) = 0.87 (304f) Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Cistribution loss factor (Table 12c) for community heating system 5 pace heating Annual space heating requirement 2 181.26		•								(-				=
Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Cistribution loss factor (Table 12c) for community heating system 1.05 (306) KWh/year Annual space heating requirement 2181.26	Fraction of tot	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a
Distribution loss factor (Table 12c) for community heating system 1.05 (306) KWh/year Annual space heating requirement 2181.26	Fraction of tot	al space	heat fro	m comm	nunity he	eat sourc	e 2			(3	02) x (303	b) =	0.87	(304b
Space heating Annual space heating requirement kWh/year 2181.26	Factor for con	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem			1	(305)
Annual space heating requirement 2181.26	Distribution lo	ss factor	(Table 1	2c) for o	commun	ity heati	ng syste	m				Ī	1.05	(306)
Annual space heating requirement 2181.26	Space heatin	g										L	kWh/yea	 r
Space heat from Community CHP (98) x (304a) x (305) x (306) = 297.74 (307a)	-	_	requiren	nent									-	
· · · · · · · · · · · · · · · · · · ·	Space heat fro	om Comr	munity C	HP					(98) x (3	04a) x (30	5) x (306) :	-	297.74	(307a)

Space heat from heat source 2		(98) x (304b) x (305) x (306) =	1992.58	(307b)
Efficiency of secondary/supplementary heating	g system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/su	upplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2079.74	7
If DHW from community scheme:		(64) v (2025) v (205) v (206)	200.00	
Water heat from Community CHP		(64) x (303a) x (305) x (306) =	283.88	(310a)
Water heat from heat source 2	•	(64) x (303b) x (305) x (306) =	1899.84	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =	44.74	(313)
Cooling System Energy Efficiency Ratio			4.73	(314)
Space cooling (if there is a fixed cooling syste	ŕ	= (107) ÷ (314) =	10.59	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or p		е	162.85	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Appendix L)			332.22	(332)
Electricity generated by PVs (Appendix M) (ne	egative quantity)		-162.5	(333)
Electricity generated by wind turbine (Append	ix M) (negative quantity)		0	(334)
Electricity generated by wind turbine (Append 10b. Fuel costs – Community heating scheme	, , , , , , , , , , , , , , , , , , , ,		0	(334)
	, , , , , , , , , , , , , , , , , , , ,	Fuel Price (Table 12)	Fuel Cost £/year	(334)
	e Fuel	Fuel Price	Fuel Cost	(334)
10b. Fuel costs – Community heating schem	e Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
10b. Fuel costs – Community heating scheme	Fuel kWh/year (307a) x	Fuel Price (Table 12) 2.97 × 0.01 =	Fuel Cost £/year	(340a)
10b. Fuel costs – Community heating scheme Space heating from CHP Space heating from heat source 2	Fuel kWh/year (307a) x (307b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49	(340a) (340b)
Space heating from CHP Space heating from heat source 2 Water heating from heat source 2 Water heating from heat source 2	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43	(340a) (340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system)	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43	(340a) (340b) (342a)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (315) (331)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55	(340a) (340b) (342a) (342b)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55	(340a) (340b) (342a) (342b) (348)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans	Fuel kWh/year (307a) x (307b) x (310a) x (315) (331)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55	(340a) (340b) (342a) (342b) (348) (349)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting	Fuel kWh/year (307a) x (307b) x (310a) x (315) (331)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55 1.4 21.48 43.82	(340a) (340b) (342a) (342b) (348) (349) (350)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (315) (331)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55 1.4 21.48 43.82 120	(340a) (340b) (342a) (342b) (348) (349) (350) (351)
Space heating from CHP Space heating from heat source 2 Water heating from CHP Water heating from heat source 2 Space cooling (community cooling system) Pumps and fans Energy for lighting Additional standing charges (Table 12) Energy saving/generation technologies Item 1	Fuel kWh/year (307a) x (307b) x (310a) x (310b) x (315) (331) (332)	Fuel Price (Table 12) 2.97	Fuel Cost £/year 8.84 84.49 8.43 80.55 1.4 21.48 43.82 120 -21.43	(340a) (340b) (342a) (342b) (348) (349) (350) (351)

Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0)] =		1.21	(357)
SAP rating (section12)				83.18	(358)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	472.61 ×	0.22	102.08	(363)
less credit emissions for electricity	-(307a) × (361) ÷ (362) =	144.62 ×	0.52	-75.06	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2	[(307b)	+(310b)] x 100 ÷ (367b) x	0.22	= 869.46	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 23.22	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)(37	72)	945.47	(373)
CO2 associated with space heating	g (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from im	mersion heater or instantar	neous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space a	and water heating	(373) + (374) + (375) =		945.47	(376)
CO2 associated with space cooling	J	(315) x	0.52	= 5.5	(377)
CO2 associated with electricity for	pumps and fans within dwe	lling (331)) x	0.52	= 84.52	(378)
CO2 associated with electricity for	lighting	(332))) x	0.52	= 172.42	(379)
Energy saving/generation technolo Item 1	gies (333) to (334) as applic	cable	0.52 x 0.01 =	-84.34	(380)
Total CO2, kg/year	sum of (376)(382) =			1123.57	(383)
Dwelling CO2 Emission Ra	te $(383) \div (4) =$			14.77	(384)
El rating (section 14)				87.56	(385)
13b. Primary Energy – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit		_		63	(362)
		Energy kWh/year	Primary factor	P.Energy kWh/year	_
Space heating from CHP)	(307a) × 100 ÷ (362) =	472.61 X	1.22	576.58	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	144.62 X	3.07	-443.98	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	450.61 ×	1.22	549.74	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 X	3.07	-423.31	(366)
Efficiency of heat source 2 (%)	If there is CHP usi	ng two fuels repeat (363) to	o (366) for the second fu	el 96.7	(367b)
Energy associated with heat source	e 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	= 4910.81	(368)
Electrical energy for heat distribution	on	[(313) x		137.35	(372)

Total Energy associated with community systems	(363)(366) + (368)(372)	=	5307.2	(373)
if it is negative set (373) to zero (unless specified otherwise	e, see C7 in Appendix C)		5307.2	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or insta	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			5307.2	(376)
Energy associated with space cooling	(315) x	3.07	=	32.52	(377)
Energy associated with electricity for pumps and fans within	dwelling (331)) x	3.07	=	499.96	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1019.91	(379)
Energy saving/generation technologies		0.04			1
Item 1		3.07 × 0.01	= _	-498.87	(380)
Total Primary Energy, kWh/year sum of (37	6)(382) =			6360.72	(383)

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	12		Stroma Softwa	are Vei	rsion:			016363 on: 1.0.4.10	
A ddrago		Pro	operty /	Address:	: Flat 4-1	I-Green				
Address: 1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	ight(m)		Volume(m³)	
Basement			5	4.34	(1a) x	2	2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	1a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	5	4.34	(4)			_		_
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	141.28	(5)
2. Ventilation rate:										
		econdary neating	1	other		total			m³ per hou	r
Number of chimneys		0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	j + F	0	 -	0	x	20 =	0	(6b)
Number of intermittent fa	ans				_ 	0	x .	10 =	0	 (7a)
Number of passive vents	S				F	0	x -	10 =	0	(7b)
Number of flueless gas t					L	0	x 4	40 =	0	` ☐ _(7c)
	•				L				Ŭ	
								Air ch	anges per ho	ur
Infiltration due to chimne	eys, flues and fans = (6	6a)+(6b)+(7a	a)+(7b)+(7c) =	Γ	0		÷ (5) =	0	(8)
	been carried out or is intend	ed, proceed	to (17), o	otherwise o	continue fr	om (9) to ((16)			-
Number of storeys in tagget Additional infiltration	the dwelling (ns)						[(0)	11v0 1 -	0	(9)
	0.25 for steel or timber	frame or (0 35 for	masonr	v constr	ruction	[(9)	-1]x0.1 =	0	(10)
	present, use the value corres				•	dottori			0	(11)
deducting areas of open	• / .	L1\ 0 -4	. / 1 -	.1\ .1	0					¬
•	floor, enter 0.2 (unsea	led) or 0.1	i (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	iter 0.05, else enter 0 is and doors draught s	trinned							0	(13)
Window infiltration	is and doors draught s	пррса		0.25 - [0.2	x (14) ÷ 1	00] =			0	(14)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) -	+ (15) =		0	(16)
Air permeability value	, q50, expressed in cul	oic metres	per ho	our per so	quare m	etre of e	envelope	area	3	(17)
If based on air permeab	ility value, then $(18) = [(18)]$	17) ÷ 20]+(8)	, otherwi	se (18) = ((16)				0.15	(18)
	es if a pressurisation test ha	s been done	e or a deg	gree air pei	rmeability	is being u	sed			_
Number of sides shelter Shelter factor	ed			(20) = 1 -	[0.075 x (1	19)1 =			2	(19)
Infiltration rate incorpora	iting shelter factor			(21) = (18)		- /1			0.85	(21)
Infiltration rate modified	-	d			, , ,				0.13	(,
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind s	peed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (20-) (2	22) 4	· ·							-	
Wind Factor $(22a)m = (22a)m = 1.27$ 1.25	22)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(22a)111- 1.21 1.20	1.20 1.1 1.00	0.93	<u> </u>	0.92		1.00	1.12	1.10	I	

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2h) _ (22c	a) v Emy (aguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=		-	(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

ntilat -	ion hea	t loss ca	alculated	monthly	/			,	(38)m	= 0.33 × (25)m x (5)			
Ļ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(
at tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		_
eat los	ss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	81.67	
)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		_
ımbe	r of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.5	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m=	31	28	31	30	31	30	31	31	30	31	30	31		
_	•		•			•		•			•			
. Wat	ter heat	ing enei	rgy requi	irement:								kWh/ye	ar:	
cuma	ad accu	pancy, l	NI											
				[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		82		
f TF/	A £ 13.9), N = 1												
								(25 x N) to achieve		se target o		7.38		
		_	person per			_	_			g				
Γ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
wate			day for ea		,									
)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
L						!	ı				m(44) ₁₁₂ =		928.53	
ergy co	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
stants	aneous w	ater heati	na at noint	of use (no	hot water	r storaga)	enter () in	boxes (46		Total = Su	m(45) ₁₁₂ =	<u> </u>	1217.45	
г								· · ·	` '	45.47	10.00	40.04		
m= [ater s	18.93 storage	16.56 loss:	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		
omm	nunity h	eating a	ınd no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
nerwi	ise if no	stored	hot wate	er (this in	ıcludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage													
			eclared I		or is kno	wn (kWh	n/day):					0		
•			m Table									0		
			storage				lea access	(48) x (49)) =		1	10		
			eclared of factor fr	-							0	02		
		_	ee secti		- ()	, 0, 0.0	.,,				0.	.02		
	factor	from Ta	ble 2a								1.	.03		
lume	rature fa	actor fro	m Table	2b							0	.6		
		m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		
mper	lost fro										1	00		
mper ergy		54) in (5	55)								١.	.03		
mper ergy nter (50) or (, ,	55) culated f	for each	month			((56)m = (55) × (41)ı	m	1.	03		

If cylinder contains dec	cated solar st	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01 28	92 32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit los	(annual) fr	om Table	 e 3							0		(58)
Primary circuit los	` ,			59)m = ((58) ÷ 36	65 × (41)	m				'	
(modified by fac	or from Tal	ble H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26 21	01 23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calcula	ted for eac	h month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required	for water h	neating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 181.5 16	.32 169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		(62)
Solar DHW input calcu	ated using Ap	pendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional line	s if FGHRS	S and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	heater											
(64)m= 181.5 16	.32 169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		_
						Outp	out from wa	ater heate	r (annual) ₁	12	1868.29	(64)
Heat gains from w	ater heating	g, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	x [(46)m	+ (57)m	+ (59)m]	
(65)m= 86.19 76	65 82.1	75.82	75.91	70.14	69.56	73.3	72.22	78.51	80.22	84.87		(65)
include (57)m in	calculation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains	see Table	5 and 5a):									
Metabolic gains (T	able 5). Wa	itts										
	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 109.08 109	.08 109.08	109.08	109.08	109.08	109.08	109.08	109.08	109.08	109.08	109.08		(66)
Lighting gains (cal	culated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				•	
(67)m= 35.32 31	37 25.51	19.32	14.44	12.19	13.17	17.12	22.98	29.18	34.05	36.3		(67)
Appliances gains	calculated i	n Appen	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5		•	•	
(68)m= 236.54 2	9 232.81	219.64	203.02	187.4	176.96	174.51	180.69	193.86	210.48	226.11		(68)
Cooking gains (ca	culated in A	Appendix	L, equat	tion L15	or L15a), also se	ee Table	5	!		•	
(69)m= 47.73 47	73 47.73	47.73	47.73	47.73	47.73	47.73	47.73	47.73	47.73	47.73		(69)
Pumps and fans g	ains (Table	5a)										
(70)m= 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapo	ation (nega	ative valu	es) (Tab	le 5)	•	•	•				•	
(71)m= -72.72 -72	.72 -72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72		(71)
Water heating gain	s (Table 5)		-	-	-	-	-	-	-	-		
(72)m= 115.85 114	.06 110.35	105.3	102.03	97.41	93.49	98.52	100.3	105.52	111.42	114.07		(72)
Total internal gai	ns =	•	•	(66)	m + (67)m	n + (68)m -	+ (69)m + ((70)m + (7	1)m + (72)	m	•	
(73)m= 471.8 468	.52 452.76	428.35	403.57	381.09	367.71	374.23	388.06	412.65	440.04	460.56		(73)
6. Solar gains:				•	•	•	•	•				
Solar gains are calcu	ated using sol	ar flux from	Table 6a	and assoc	iated equa	itions to co	onvert to th	ne applicat	ole orienta	ion.		
Orientation: Acce		Area m²		Flu Tal	x ble 6a	Т	g_ able 6b	T	FF able 6c		Gains (W)	

N. 11		7		ı			_						_
Northeast _{0.9x}	0.77	X	7.15	Х	11.28	×	` <u>لــــ</u>	0.24	x	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.97	,	۱ <u> </u>	0.24	x	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	X	7.15	X	41.38	X	٠ <u> </u>	0.24	x	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	X	7.15	X	67.96	,	٠	0.24	x	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	X	7.15	X	91.35	Х	(0.24	х	0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	X	7.15	X	97.38	Х		0.24	x	0.7	=	162.13	(75)
Northeast 0.9x	0.77	X	7.15	x	91.1	×	(0.24	x	0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	X	7.15	x	72.63	Х		0.24	x [0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	X	7.15	x	50.42	Х		0.24	x	0.7	=	83.94	(75)
Northeast _{0.9x}	0.77	X	7.15	x	28.07	Х		0.24	x [0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	X	7.15	x	14.2	Х	(0.24	x [0.7	=	23.64	(75)
Northeast _{0.9x}	0.77	X	7.15	х	9.21	Х	(0.24	х	0.7	=	15.34	(75)
Southwest _{0.9x}	0.77	x	2.19	x	36.79			0.24	x	0.7	=	9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.79			0.24	x	0.7	=	3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	x	62.67			0.24	x	0.7	=	15.98	(79)
Southwest _{0.9x}	0.77	X	0.75	x	62.67			0.24	_ x [0.7		5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	x	85.75			0.24	= x [0.7	=	21.86	(79)
Southwest _{0.9x}	0.77	X	0.75	x	85.75			0.24	= x	0.7		7.49	(79)
Southwest _{0.9x}	0.77	X	2.19	x	106.25			0.24	= x [0.7	=	27.09	(79)
Southwest _{0.9x}	0.77	x	0.75	x	106.25			0.24	= x [0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	×	2.19	x	119.01			0.24	_ x [0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	×	0.75	x	119.01			0.24	_ x [0.7		10.39	(79)
Southwest _{0.9x}	0.77	X	2.19	х	118.15			0.24	x	0.7	=	30.12	(79)
Southwest _{0.9x}	0.77	X	0.75	x	118.15			0.24	x	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	X	2.19	x	113.91			0.24	x	0.7	=	29.04	(79)
Southwest _{0.9x}	0.77	X	0.75	x	113.91			0.24	x	0.7	=	9.95	(79)
Southwest _{0.9x}	0.77	X	2.19	x	104.39			0.24	x [0.7	=	26.62	(79)
Southwest _{0.9x}	0.77	X	0.75	x	104.39			0.24	x	0.7	=	9.12	(79)
Southwest _{0.9x}	0.77	X	2.19	x	92.85			0.24	х	0.7	=	23.67	(79)
Southwest _{0.9x}	0.77	X	0.75	x	92.85			0.24	x	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	X	2.19	x	69.27			0.24	x	0.7	=	17.66	(79)
Southwest _{0.9x}	0.77	X	0.75	X	69.27			0.24	x	0.7	=	6.05	(79)
Southwest _{0.9x}	0.77	X	2.19	x	44.07			0.24	x [0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	X	0.75	X	44.07			0.24	x [0.7	=	3.85	(79)
Southwest _{0.9x}	0.77	X	2.19	X	31.49			0.24	x	0.7	=	8.03	(79)
Southwest _{0.9x}	0.77	X	0.75	X	31.49			0.24	X	0.7	=	2.75	(79)
Solar gains in wa					00 57 400			um(74)m		T 00.70		1	(02)
(83)m= 31.38 Total gains – into		.24 solar	$\begin{array}{c c} 149.51 & 192.8 \\ \hline (84)m = (73)n \end{array}$		02.57 190.		56.65	115.73	70.44	38.72	26.12		(83)
		51 solal	577.85 596.3	<u> </u>	83.66 558.		30.88	503.78	483.09	478.77	486.68	1	(84)
` '					00.00 000.	.57 3.	50.00	303.70	400.00	470.77	400.00	l	(01)
7. Mean interna					oroc frame	Tab!-	O TI	1 (00)				2:	(05)
Temperature d	•	•		•			ษ, In	1 (10)				21	(85)
Utilisation facto				Ť			Διια	Sep	Oct	Nov	Dec	I	
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(86)m=	0.99	0.99	0.98	0.95	0.89	0.75	0.6	0.64	0.84	0.95	0.98	0.99		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.57	19.69	19.93	20.29	20.63	20.87	20.96	20.95	20.78	20.37	19.92	19.54		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.67	19.67	19.67	19.68	19.69	19.7	19.7	19.7	19.69	19.69	19.68	19.68		(88)
l Itilies	ation fac	tor for a	ains for	rest of d	welling	h2 m (se	e Table	(a)					l	
(89)m=	0.99	0.98	0.97	0.93	0.84	0.65	0.44	0.49	0.76	0.93	0.98	0.99		(89)
			l .	<u> </u>		L TO //	. !!	0 42 :		L 0 = \	<u> </u>			
(90)m=	17.83	18.01	18.36	18.87	19.32	ng 12 (f	ollow ste	19.68	7 IN Tabi	18.99	18.35	17.8		(90)
(90)111=	17.03	10.01	10.30	10.07	19.32	19.01	19.00	19.00		fLA = Livin			0.25	(91)
										IL/ (— LIVII)	g aroa . (0.25	(91)
			· `	ı	i	· · · · ·	LA × T1	+ (1 – fL	r			1	Ī	
(92)m=	18.27	18.43	18.76	19.22	19.65	19.93	20	20	19.84	19.34	18.74	18.24		(92)
			r	r		r	m Table			ri — —		1	I	(00)
(93)m=	18.27	18.43	18.76	19.22	19.65	19.93	20	20	19.84	19.34	18.74	18.24		(93)
•			uirement							. —.				
			ernal ter or gains			ed at st	ep 11 of	Table 9	b, so tha	it Ti,m=(76)m an	d re-calc	culate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>	ividy	Odii	l oai		_ ССР	1 000	1101	_ DC0		
(94)m=	0.98	0.97	0.96	0.92	0.84	0.67	0.48	0.53	0.77	0.92	0.97	0.98		(94)
	∟∟∟⊔ ıl ɑains.	hmGm	, W = (94	1	L 4)m	l	l	l	l		l			
(95)m=		514.45	528.47	532.26	498.22	389.66	267.31	278.75	388.38	446.18	463.87	478.11		(95)
Montl	hly avera	age exte	rnal tem	perature	from Ta	able 8	l	l	l	<u> </u>	l	<u> </u>		
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm,W =	=[(39)m :	x [(93)m	– (96)m	1 1	!			
(97)m=			1010.41		648.39	430.65	275.12	290.2	465.43	712.67	952.61	1153.06		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95	o)m] x (4	1)m		l	
(98)m=	492.85	405.14	358.56	224	111.73	0	0	0	0	198.27	351.9	502.16		
								Tota	l per year	(kWh/year	·) = Sum(9	8) _{15,912} =	2644.61	(98)
Spac	e heatin	a require	ement in	kWh/m²	2/vear								48.67	(99)
•		• ,			, y oa.								10.07	
		Ĭ	quiremer		O T-I	-1- 40-								
Caicu	Jan	r June, c Feb	July and Mar	August. Apr	See Tai	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat				<u> </u>					<u> </u>	<u> </u>		able 10)		
(100)m=		0	0	0	0	759.65	598.02	613.05	0	0	0	0		(100)
	ation fac		<u> </u>											, ,
(101)m=		0	0	0	0	0.71	0.8	0.76	0	0	0	0		(101)
		mLm (V	ı √atts) = ((100)m x	(101)m	<u> </u>	l	l	l		l			
(102)m=		0	0	0	0	542.27	478.02	468.69	0	0	0	0		(102)
Gains	s (solar o	gains ca	ı lculated	ror appli	cable w	eather re	egion, se	e Table	10)	!	l	<u> </u>		
(103)m=	<u> </u>	0	0	0	0	617.86	590.56	557.32	0	0	0	0		(103)
		g require	ement fo	r month.	whole o	lwelling.	continu	ous (kW	h = 0.0	24 x [(10)3)m – (102)m] :	x (41)m	
			104)m <				_	<u> </u>			, \	, ,		
(104)m=	0	0	0	0	0	0	83.73	65.94	0	0	0	0		
									Total	I = Sum(104)	=	149.67	(104)

On the differentials										4)		(405)
Cooled fraction Intermittency factor (Table 10b)					1 C =	cooled	area ÷ (4) =	0.7	(105)
(106)m = 0 0	0	0	0	0.25	0.25	0.25	0	0	0	0		
Chara cooling requir	omant for	manth	(101)m	(10F)	(106)	_	Tota	I = Sum	(104)	=	0	(106)
Space cooling require (107)m= 0 0		0	0	x (105)	14.64	11.53	0	0	0	0	1	
L L	•	l		ļ.	l	!	Tota	l = Sum((107)	=	26.17	(107)
Space cooling require	ement in k	kWh/m²/	year				(107) ÷ (4) =			0.48	(108)
9b. Energy requirement												
This part is used for s Fraction of space hea									unity so	heme.	0	(301)
Fraction of space hea	at from co	mmunity	/ system	1 – (30	1) =						1	(302)
The community scheme mincludes boilers, heat pum	-							up to four	other hea	t sources;	the latter	
Fraction of heat from	Commun	ity CHP									0.13	(303a)
Fraction of communit	y heat fro	m heat s	source 2								0.87	(303b)
Fraction of total space	e heat fro	m Comn	nunity C	HP				(3	802) x (30	3a) =	0.13	(304a)
Fraction of total space	e heat fro	m comm	nunity he	at sourc	e 2			(3	802) x (30	3b) =	0.87	(304b)
Factor for control and	d charging	method	l (Table	4c(3)) fo	r comm	unity hea	ting sys	tem			1	(305)
Distribution loss facto	or (Table 1	(2c) for (commun	ity hoatii	na eveta	m					1.05	(306)
	•	- /	Jonnan	ity neath	ig syste	111					1.05	(300)
Space heating	·	·	oomman	ity ricatii	ig syste	111					kWh/ye	
Annual space heating	g requirem	nent	oonman.	ity fieatii	ig syste	111					kWh/ye 2644.61	ar
Annual space heating Space heat from Cor	g requirem	nent :HP		ny mean	ig syste	111	(98) x (3	04a) x (30	5) x (306)	=	kWh/ye	
Annual space heating	g requirem	nent :HP	oon ma	ny neam	ig syste		`	04a) x (30 04b) x (30	, , ,		kWh/ye 2644.61	ar
Annual space heating Space heat from Cor	g requirem nmunity C t source 2	nent HP					(98) x (3	04b) x (30	5) x (306)		kWh/ye 2644.61 360.99	(307a)
Annual space heating Space heat from Cor Space heat from hea	g requirem mmunity C t source 2 ary/supple	nent HP mentary	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30	5) x (306)		kWh/ye 2644.61 360.99 2415.86	(307a) (307b)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating	g requirem nmunity C t source 2 ary/supple ement from	nent HP mentary m secon	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30 Appendix	5) x (306)		kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating	g requirem nmunity C t source 2 ary/supple ement from g requirem	nent HP mentary m secon	heating	system	in % (fro	om Table	(98) x (36 4a or A	04b) x (30 Appendix	5) x (306)		kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating	g requirem mmunity C t source 2 ary/supple ement from g requirem nity schem	nent HP mentary m secon ent	heating	system	in % (fro	om Table	(98) x (36 4a or A (98) x (36	04b) x (30 Appendix	5) x (306) x E) ÷ (308) =	=	kWh/ye 2644.61 360.99 2415.86 0	(307a) (307b) (308
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from communications	g requirement source 2 erry/supple ement from requirement schement munity C	nent HP mentary m secon ent ne:	heating	system	in % (fro	om Table	(98) x (36 4a or A (98) x (36 (64) x (36	04b) x (30 appendix 01) x 100	5) x (306) (E) ÷ (308) =	=	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29	(307a) (307b) (308 (309)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from community Water heat from Core	g requirement source 2 ary/supple ement from g requiremently schement munity C t source 2	nent HP mentary m secon ent ne:	heating	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29	(307a) (307b) (308 (309) (310a)
Annual space heating Space heat from Cor Space heat from hea Efficiency of seconda Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat	g requirement source 2 ary/supple ement from the prequirement from the prequirement of the source 2 art distributed	ment HP mentary m secon ent ne: HP	r heating ndary/sup	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68	(307a) (307b) (308 (309) (310a) (310b)
Annual space heating Space heat from Cor Space heat from hea Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he	g requirement source 2 ary/supple ement from the prequirement munity Control to source 2 art distributes	ment HP mentary m secon ent he: HP ution ncy Rati	heating ndary/sup	system	in % (fro	om Table em	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39	(307a) (307b) (308 (309) (310a) (310b) (313)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for heat Cooling System Ener	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 2 to source 3 to sour	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dv	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73	(307a) (307b) (308 (309) (310a) (310b) (313) (314)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if ther Electricity for pumps	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 eat distribute gy Efficiente is a fixed and fans with a balance.	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dv	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if there Electricity for pumps mechanical ventilation	g requirement source 2 ary/supple ement from the prequirement munity C to source 2 eat distribute gy Efficiente is a fixed and fans with the present t	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy	o g systen welling (system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36 4a or A (98) x (36 (64) x (36 (64) x (36 x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a)
Annual space heating Space heat from Cor Space heat from heat Efficiency of secondar Space heating requir Water heating Annual water heating If DHW from community Water heat from Cor Water heat from heat Electricity used for he Cooling System Ener Space cooling (if there Electricity for pumps mechanical ventilation warm air heating system	g requirement source 2 ary/supple ement from the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source 2 arguirement of the source and fans the source of the sou	ment HP mentary m secon ent he: HP ution ncy Rati d coolin within dy ed, extra	o g systen welling (T	system oplemen n, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (36) 4a or A (98) x (36) (64) x (36) (64) x (36) x [(307a) = (107) =	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) 5) x (308) = 5) x (306) 5) x (306) 10 + (310a)	= = =	kWh/ye 2644.61 360.99 2415.86 0 0 1868.29 255.02 1706.68 47.39 4.73 5.54 90.49 0	(307a) (307b) (308 (308) (309) (310a) (310b) (313) (314) (315) (330a) (330b)

					_
Energy for lighting (calculated in Ap	•			249.52	(332)
Electricity generated by PVs (Appe	, , , , , , , , , , , , , , , , , , , ,			-116.33	(333)
Electricity generated by wind turbin	e (Appendix M) (negative q	uantity)		0	(334)
10b. Fuel costs – Community hear	ting scheme				
	Fuel kWh/year		Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	[2.97 x 0.01	= 10.72	(340a)
Space heating from heat source 2	(307b) x]	4.24 x 0.01	= 102.43	(340b)
Water heating from CHP	(310a) x]	2.97 x 0.01	= 7.57	(342a)
Water heating from heat source 2	(310b) x]	4.24 x 0.01	= 72.36	(342b)
			Fuel Price		_
Space cooling (community cooling	system) (315)	[13.19 × 0.01	= 0.73	(348)
Pumps and fans	(331)	[13.19 × 0.01	= 11.94	(349)
Energy for lighting	(332)	[13.19 × 0.01	32.91	(350)
Additional standing charges (Table	12)			120	(351)
Energy saving/generation technologitem 1	gies	Γ	13.19 × 0.01	= -15.34	(352)
Total energy cost	= (340a)(342e) + (345)	.(354) =	13.19	343.32	(355)
11b. SAP rating - Community hear				343.32	
	ang conome				7
Energy cost deflator (Table 12)	[(355) \ (356)] \ [(4) \ 45 0	1 _		0.42	(356)
Energy cost factor (ECF) SAP rating (section12)	[(355) x (356)] ÷ [(4) + 45.0] =		1.45	(357)
12b. CO2 Emissions – Community	heating scheme			79.75	(358)
Electrical efficiency of CHP unit	ricating scrience			30.6	(361)
Heat efficiency of CHP unit				63	」 (362)
·		Energy	Emission factor	or Emissions	
		kWh/year	kg CO2/kWh	kg CO2/year	
Space heating from CHP)	(307a) × 100 ÷ (362) =	573	x 0.22	123.77	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	175.34	x 0.52	-91	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	404.8	x 0.22	87.44	(365)
less credit emissions for electricity	-(310a) × (361) ÷ (362) =	123.87	x 0.52	-64.29	(366)
Efficiency of heat source 2 (%)	If there is CHP using	ng two fuels repeat (36	3) to (366) for the second	fuel 96.7	(367b)
CO2 associated with heat source 2	[(307b)	+(310b)] x 100 ÷ (367b	0.22	920.86	(368)
Electrical energy for heat distribution	on	[(313) x	0.52	= 24.59	(372)
Total CO2 associated with commun	nity systems	(363)(366) + (368)	(372)	= 1001.37	(373)
CO2 associated with space heating	ı (secondary)	(309) x	0	= 0	(374)

				7
CO2 associated with water from immersion heater or instantan	eous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		1001.37	(376)
CO2 associated with space cooling	(315) x	0.52	= 2.87	(377)
CO2 associated with electricity for pumps and fans within dwel	ling (331)) x	0.52	= 46.97	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 129.5	(379)
Energy saving/generation technologies (333) to (334) as application 1	cable	0.52 x 0.01	= -60.38	(380)
Total CO2, kg/year sum of (376)(382) =			1120.33] (383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			20.62	(384)
El rating (section 14)			84.89	(385)
13b. Primary Energy – Community heating scheme				_
Electrical efficiency of CHP unit			30.6	(361)
Heat efficiency of CHP unit			63	(362)
	Energy	Primary	P.Energy	_
	kWh/year	factor	kWh/year	
Space heating from CHP) $(307a) \times 100 \div (362) =$	573 ×	1.22	699.06	(363)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$	175.34 ×	3.07	-538.29	(364)
Water heated by CHP $(310a) \times 100 \div (362) =$	404.8 ×	1.22	493.85	(365)
less credit emissions for electricity $-(310a) \times (361) \div (362) =$	123.87 ×	3.07	-380.27	(366)
Efficiency of heat source 2 (%)	ng two fuels repeat (363) to	(366) for the second f	fuel 96.7	(367b)
Energy associated with heat source 2 [(307b)	+(310b)] x 100 ÷ (367b) x	1.22	= 5201.13	(368)
Electrical energy for heat distribution	[(313) x		= 145.47	(372)
Total Energy associated with community systems	(363)(366) + (368)(37	2)	= 5620.95	(373)
if it is negative set (373) to zero (unless specified otherwise,	see C7 in Appendix C	()	5620.95	(373)
Energy associated with space heating (secondary)	(309) x	0	= 0	(374)
Energy associated with water from immersion heater or instant	aneous heater(312) x	1.22	= 0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =		5620.95	(376)
Energy associated with space cooling	(315) x	3.07	= 17	(377)
Energy associated with electricity for pumps and fans within dv	velling (331)) x	3.07	= 277.81	(378)
Energy associated with electricity for lighting	(332))) x	3.07	= 766.03	(379)
Energy saving/generation technologies Item 1		3.07 × 0.01	= -357.15	(380)
Total Primary Energy, kWh/year sum of (376)	(382) =		6324.65	(383)

		User_I	Details:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					0016363 on: 1.0.4.10	
		Property	Address	: Flat 4-:	2-Green				
Address: 1. Overall dwelling dime	ancione:								
1. Overall dwelling dime	#1151U115.	Δre	a(m²)		Δν Ηρ	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	144.59	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	55.61] [(4)			_		
Dwelling volume		·'/ L		J)+(3c)+(3c	d)+(3e)+	(3n) =	444.50	
				(00)1(00	,,,,(00),(00	<i>a)</i>	(011) =	144.59	(5)
2. Ventilation rate:	main seconda	rv	other		total			m³ per hou	ır
Number of chimneys	heating heating	, +		7 = [40 =	-	_
•		ᆜ =	0	╛╘	0		20 =	0	(6a)
Number of open flues	0 + 0	+	0	╛╸	0			0	(6b)
Number of intermittent fa	ans			L	0	x	10 =	0	(7a)
Number of passive vents	3				0	Х	10 =	0	(7b)
Number of flueless gas f	ires				0	X	40 =	0	(7c)
							Air ch	nanges per ho	our.
	fl (Co).(Cb).	(7a) . (7b) .	(7 0)	_					_
	eys, flues and fans = (6a)+(6b)+ eeen carried out or is intended, proce			continue fi	0 rom (9) to	(16)	÷ (5) =	0	(8)
Number of storeys in t		ou to (11),	ouror moo	oonanao n	0111 (0) 10	(10)		0	(9)
Additional infiltration						[(9)-1]x0.1 =	0	(10)
	0.25 for steel or timber frame of			•	ruction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresponding	to the grea	ter wall are	ea (after					
-	floor, enter 0.2 (unsealed) or ().1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else enter 0							0	(13)
Percentage of window	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2					0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metrility value, then $(18) = [(17) \div 20] +$	•	•	•	etre of e	envelope	e area	3	(17)
•	es if a pressurisation test has been do				is beina u	sed		0.15	(18)
Number of sides sheltere			g p -	,				3	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	3) x (20) =				0.12	(21)
Infiltration rate modified t	for monthly wind speed						_	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp								1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		•	•	•	•	•	•	•	

Adjusted infiltra	ation rate	e (allowi	ng for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effec		•	rate for t	he appli	cable ca	se		l	!				
If mechanica			and a N. (O	10l-) (00·	-) - - - /	(* /1	NIT\\ alla		\ (00-)			0.5	(23a
If exhaust air he		0		, ,	,	. `	,, .	,) = (23a)			0.5	(23b
If balanced with		-	-	_								76.5	(230
a) If balance					1	- ` ` 	- 	í `	, 	, 	- ` ` `) ÷ 100]	(0.1
(24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(24a
b) If balance				ı —	1	, 	, 	ŕ	, ´ ` `		1	1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b
c) If whole ho				•					F (00h	. \			
if (22b)m	0.5 X	(236), t	nen (240	(230) = (230)		wise (24	$\frac{(22)}{0}$	0) m + 0	.5 × (230	0	0	1	(240
\ ',				<u> </u>	ļ			<u> </u>				J	(240
d) If natural v if (22b)m				•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(240
Effective air	change	rate - er	nter (24a	or (24h	b) or (24	c) or (24	ld) in bo	(25)				_	
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	1	(25)
0 1100110000	امط امداد	ot loss										7	
3. Heat losses		·			Not Ar		Haral		AXU		le volu	•	A X k
ELEMENT	Gros area	_	Openin m		Net Ar A ,r		U-val W/m2		(W/I	K)	k-valu kJ/m²·		A A K kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	: 1				7.15	x1	/[1/(1.2)+	0.04] =	8.19				(27)
Windows Type	2				2.19	x1	/[1/(1.2)+	0.04] =	2.51				(27)
Windows Type	3				0.75	x1	/[1/(1.2)+	0.04] =	0.86	=			(27)
Walls Type1	34.6	6	17.24	4	17.42	2 x	0.15	¬ ₌ i	2.61	= [(29)
Walls Type2	23.9	12	2.6	=	21.32		0.15	= :	3.2	=		7 H	(29)
Walls Type3	2.63		0	=	2.63		0.15		0.39	=		\exists \vdash	(29)
Walls Type4	25.1		0	=	25.13	=	0.15	=	3.77	룩 ¦		-	(29)
Roof				=		=				믁 片		\dashv \vdash	=
Total area of el	55.6		0		55.6	=	0.15	=	8.34				(30)
	iements	, 111-			141.9	=							(31)
Party wall					7.81	X	0	=	0			_	(32)
•													
Party floor					55.6			<i>"</i>		L			(32a
Party floor * for windows and					alue calcui		g formula 1	/[(1/U-valu	ue)+0.04] a	as given in	paragrapi	h 3.2	(32a
Party floor	as on both	sides of in	nternal wall		alue calcui		g formula 1	-	ue)+0.04] a	as given in	paragrapi	h 3.2	(32a
Party floor * for windows and ** include the area	s on both s, W/K =	sides of in	nternal wall		alue calcui) + (32) =	ue)+0.04] a				(33)
Party floor * for windows and ** include the area Fabric heat los	as on both ss, W/K = Cm = S(sides of in = S (A x (A x k)	nternal wali U)	ls and par	alue calcul titions	lated using) + (32) = ((28).	, -	2) + (32a).		41.18	(33)
Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass For design assess	as on both as, W/K = Cm = S(parame aments who	sides of in = S (A x (A x k) ster (TMF) where the de	nternal wall U) P = Cm ÷ etails of the	ls and pan	alue calcul titions n kJ/m²K	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32 itive Value	2) + (32a). : Medium	(32e) =	41.18	(33)
Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass	es on both es, W/K = Cm = S(parame ements whe ad of a det	sides of in = S (A x (A x k) ster (TMF ere the de tailed calcu	nternal wall U) P = Cm ÷ etails of the ulation.	ls and pan - TFA) ir construct	alue calcul titions n kJ/m²K tion are no	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32 itive Value	2) + (32a). : Medium	(32e) =	41.18	(33)

												_
Total fabric heat							` '	(36) =			69.75	(37)
Ventilation heat I		·	í	T	T	1			25)m x (5)		1	
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m= 12.68	12.54 12.4	11.71	11.57	10.88	10.88	10.74	11.15	11.57	11.85	12.12		(38)
Heat transfer coe							(39)m	= (37) + (3	38)m		1	
(39)m= 82.42	82.28 82.15	81.45	81.31	80.62	80.62	80.48	80.9	81.31	81.59	81.87		¬(00)
Heat loss param	eter (HLP). W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	.12 /12=	81.42	(39)
	1.48 1.48	1.46	1.46	1.45	1.45	1.45	1.45	1.46	1.47	1.47		
	<u>!</u>		<u> </u>	<u> </u>	<u> </u>		,	Average =	Sum(40) _{1.}	.12 /12=	1.46	(40)
Number of days	in month (Tab	le 1a)										_
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28 31	30	31	30	31	31	30	31	30	31		(41)
4. Water heating	g energy requ	irement:								kWh/ye	ear:	
Assumed occupa	ancv N								1	86		(42)
if TFA > 13.9,	• •	(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	013 x (ΓFA -13.		00		(42)
if TFA £ 13.9,						(O= 11)					ı	
Annual average Reduce the annual a								se target o		.26		(43)
not more that 125 litr								J				
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in li	tres per day for e	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					l	
(44)m= 86.09	82.96 79.83	76.7	73.57	70.44	70.44	73.57	76.7	79.83	82.96	86.09		
				400 1/4		T /000			m(44) ₁₁₂ =		939.13	(44)
Energy content of ho				1	ı			,	1	,	ı	
(45)m= 127.67 1	111.66 115.22	100.45	96.39	83.17	77.07	88.44	89.5	104.3	113.85	123.64		7(45)
If instantaneous water	er heating at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46)		Γotal = Su	m(45) ₁₁₂ =		1231.35	(45)
(46)m= 19.15	16.75 17.28	15.07	14.46	12.48	11.56	13.27	13.42	15.65	17.08	18.55		(46)
Water storage lo	I											, ,
Storage volume	(litres) includir	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel)		(47)
If community hea	ating and no ta	ank in dw	velling, e	nter 110	litres in	(47)						
Otherwise if no s		er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage lo a) If manufacture		nee fact	or ie kna	wn (k\//k	2/d2v/):						[(40)
Temperature fac			JI IS KIIO	wii (Kvvi	i/uay).)		(48)
Energy lost from			oor			(48) x (49)	_			0		(49)
b) If manufactur	_	-		or is not		(46) X (49)	_		1	10		(50)
Hot water storag		-							0.	02		(51)
If community hea	•	on 4.3										
Volume factor from		O.L							1.	03		(52)
Temperature fac									0	.6		(53)
Energy lost from	_	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =	-	03		(54)
Enter (50) or (54	+) 111 (33)								1.	03		(55)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 182.94	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-					-	-		
(64)m= 182.94	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		
	•						Outp	out from wa	ater heate	r (annual) ₁	12	1882.19	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 86.67	77.07	82.53	76.2	70.07	70.45					I	1		(05)
· /	1	02.55	70.2	76.27	70.45	69.85	73.63	72.55	78.9	80.65	85.33		(65)
include (57)	<u> </u>	<u> </u>			<u> </u>	<u> </u>		<u> </u>		<u> </u>		eating	(65)
` '	m in cal	culation o	of (65)m	only if c	<u> </u>	<u> </u>		<u> </u>		<u> </u>		eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		<u> </u>		<u> </u>		eating	(65)
include (57)	m in cald	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>		eating	(65)
include (57) 5. Internal g	m in calo ains (see ns (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling	<u> </u>	ater is fr	om com	munity h	eating	(66)
include (57) 5. Internal gain Metabolic gain Jan	m in caldains (see	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 111.31	only if constant of the consta	Jun	Jul	Aug 111.31	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal gradients Metabolic gair Jan (66)m= 111.31	m in caldains (see	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 111.31	only if constant of the consta	Jun	Jul	Aug 111.31	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal games Metabolic gain Jan (66)m= 111.31 Lighting gains (67)m= 36.05	m in calcular min	ETable 5 E Table 5 E 5), Wat Mar 111.31 ted in Ap 26.04	of (65)m 6 and 5a tts Apr 111.31 opendix 19.71	May 111.31 L, equati	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
include (57) 5. Internal given by the second of the secon	m in calcular min	ETable 5 E Table 5 E 5), Wat Mar 111.31 ted in Ap 26.04	of (65)m 6 and 5a tts Apr 111.31 opendix 19.71	May 111.31 L, equati	Jun 111.31 ion L9 o	Jul 111.31 r L9a), a	Aug 111.31 Iso see	Sep 111.31 Table 5 23.45	Oct 111.31	Nov	Dec	eating	(66)
include (57) 5. Internal given by the second of the secon	m in calcular (calcular subsections)	Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	only if c May 111.31 L, equati 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Tal 184.42	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
include (57) 5. Internal gradients Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga	m in calcular (calcular subsections)	Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62	of (65)m 5 and 5a ts Apr 111.31 opendix 19.71 Appendix 224.18	only if c May 111.31 L, equati 14.74 dix L, eq 207.21	Jun 111.31 ion L9 of 12.44 uation L 191.27	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62	Aug 111.31 Iso see 17.47 3a), also	Sep 111.31 Table 5 23.45 see Tal 184.42	Oct 111.31 29.78 ble 5 197.86	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67)
include (57) 5. Internal graph Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances gains (68)m= 241.43 Cooking gains (69)m= 47.99	m in calcular sections (Table Feb 111.31 (calcular 32.02 ins (calcular 47.99	Evaluation of Ev	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equati 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Tal 184.42	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
include (57) 5. Internal given by the second of the secon	m in calcular sections (Table Feb 111.31 (calcular 32.02 ins (calcular 47.99	Evaluation of Ev	of (65)m s and 5a ts Apr 111.31 opendix 19.71 n Append 224.18 opendix 47.99	May 111.31 L, equati 14.74 dix L, eq 207.21 L, equat	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11	Sep 111.31 Table 5 23.45 see Tal 184.42	Oct 111.31 29.78 ble 5 197.86 5	Nov 111.31 34.76	Dec 111.31 37.05	eating	(66) (67) (68)
include (57) 5. Internal graph of the following gains (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances gains (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fair (70)m= 0	m in calc ains (see as (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93 (calcula 47.99 as gains 0	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62 ated in Ap 47.99 (Table 5	of (65)m and 5a ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 0	only if controls: May 111.31 L, equati 14.74 dix L, equati 207.21 L, equati 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11 , also se 47.99	Sep 111.31 Table 5 23.45 see Tal 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57) 5. Internal given by the second of the secon	m in calc ains (see as (Table Feb 111.31 (calcula 32.02 ins (calcula 243.93 (calcula 47.99 as gains 0	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62 ated in Ap 47.99 (Table 5	of (65)m and 5a ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 0	only if controls: May 111.31 L, equati 14.74 dix L, equati 207.21 L, equati 47.99	Jun 111.31 ion L9 of 12.44 uation L 191.27 ion L15 47.99	Jul 111.31 r L9a), a 13.44 13 or L1: 180.62 or L15a)	Aug 111.31 Iso see 17.47 3a), also 178.11 , also se 47.99	Sep 111.31 Table 5 23.45 see Tal 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57) 5. Internal given by the second secon	m in calcular services (Table Feb 111.31 (calcular 32.02 ins (calcular 47.99 ins gains 0 (caporatic 74.21	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62 uted in Ap 47.99 (Table 5 0 on (negation of the content of the cont	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu	only if constructions: May 111.31 L, equation 14.74 dix L, equation 207.21 L, equation 47.99 0 es) (Tab	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5)	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99	Sep 111.31 Table 5 23.45 see Tal 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57) 5. Internal grant Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 0 Losses e.g. ev	m in calcular services (Table Feb 111.31 (calcular 32.02 ins (calcular 47.99 ins gains 0 (caporatic 74.21	culation of Table 5 2 5), Wat Mar 111.31 ted in Ap 26.04 ulated in 237.62 uted in Ap 47.99 (Table 5 0 on (negation of the content of the cont	of (65)m s and 5a ts Apr 111.31 ppendix 19.71 Append 224.18 ppendix 47.99 5a) 0 tive valu	only if constructions: May 111.31 L, equation 14.74 dix L, equation 207.21 L, equation 47.99 0 es) (Tab	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5)	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99	Sep 111.31 Table 5 23.45 see Tal 184.42 ee Table 47.99	Oct 111.31 29.78 ble 5 197.86 5 47.99	Nov 111.31 34.76 214.83 47.99	Dec 111.31 37.05 230.77	eating	(66) (67) (68) (69)
include (57) 5. Internal gram Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -74.21 Water heating	m in calcular services of the calcular service	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negative Solution Solution of the Europe Solution (negative Solution Solution of the Europe Solution (negative Solution Solution of the Europe Solution of the Europe Solution (negative Solution of the Europe Solution of the Eu	of (65)m ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 0 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99 0	Sep 111.31 Table 5 23.45 See Tal 184.42 ee Table 47.99 0	Oct 111.31 29.78 ble 5 197.86 5 47.99 0 -74.21	Nov 111.31 34.76 214.83 47.99 0 -74.21	Dec 111.31 37.05 230.77 47.99 0	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal gram Metabolic gair Jan (66)m= 111.31 Lighting gains (67)m= 36.05 Appliances ga (68)m= 241.43 Cooking gains (69)m= 47.99 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -74.21 Water heating (72)m= 116.49	m in calcular services of the calcular service	culation of the Europe Solution of the Europe Solution of the Europe Solution of the Europe Solution (Table Solution (negative Solution Solution of the Europe Solution (negative Solution Solution of the Europe Solution (negative Solution Solution of the Europe Solution of the Europe Solution (negative Solution of the Europe Solution of the Eu	of (65)m ts Apr 111.31 ppendix 19.71 Appendix 224.18 ppendix 47.99 5a) 0 tive valu -74.21	only if constructions only if constructions only if constructions on the construction of the construction	Jun 111.31 ion L9 o 12.44 uation L 191.27 ion L15 47.99 0 le 5) -74.21	Jul 111.31 r L9a), a 13.44 13 or L1 180.62 or L15a) 47.99	Aug 111.31 Iso see 17.47 3a), also 178.11 1, also se 47.99 0	Sep 111.31 Table 5 23.45 See Tal 184.42 ee Table 47.99 0 -74.21	Oct 111.31 29.78 ble 5 197.86 5 47.99 0 -74.21	Nov 111.31 34.76 214.83 47.99 0 -74.21	Dec 111.31 37.05 230.77 47.99 0	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	x	7.15	×	11.28	x	0.24	×	0.7	= [18.78	(75)
Northeast 0.9x 0.77	x	7.15	x	22.97	×	0.24	x	0.7	= [38.24	(75)
Northeast 0.9x 0.77	x	7.15	X	41.38	×	0.24	x	0.7	= [68.89	(75)
Northeast 0.9x 0.77	x	7.15	x	67.96	×	0.24	x	0.7	= [113.14	(75)
Northeast 0.9x 0.77	x	7.15	X	91.35	X	0.24	X	0.7	=	152.08	(75)
Northeast 0.9x 0.77	x	7.15	X	97.38	x	0.24	x	0.7	= [162.13	(75)
Northeast 0.9x 0.77	x	7.15	X	91.1	X	0.24	X	0.7	=	151.67	(75)
Northeast 0.9x 0.77	x	7.15	X	72.63	x	0.24	x	0.7	= [120.91	(75)
Northeast _{0.9x} 0.77	x	7.15	X	50.42	x	0.24	x	0.7	= [83.94	(75)
Northeast 0.9x 0.77	x	7.15	X	28.07	x	0.24	x	0.7	= [46.73	(75)
Northeast 0.9x 0.77	x	7.15	X	14.2	X	0.24	X	0.7	= [23.64	(75)
Northeast 0.9x 0.77	x	7.15	X	9.21	x	0.24	x [0.7	= [15.34	(75)
Southwest _{0.9x} 0.77	x	2.19	X	36.79		0.24	X	0.7	= [9.38	(79)
Southwest _{0.9x} 0.77	x	0.75	X	36.79		0.24	x	0.7	= [3.21	(79)
Southwest _{0.9x} 0.77	x	2.19	X	62.67		0.24	x	0.7	= [15.98	(79)
Southwest _{0.9x} 0.77	x	0.75	X	62.67		0.24	x	0.7	= [5.47	(79)
Southwest _{0.9x} 0.77	x	2.19	X	85.75		0.24	x	0.7	= [21.86	(79)
Southwest _{0.9x} 0.77	x	0.75	X	85.75		0.24	x	0.7	= [7.49	(79)
Southwest _{0.9x} 0.77	x	2.19	X	106.25		0.24	x	0.7	= [27.09	(79)
Southwest _{0.9x} 0.77	x	0.75	X	106.25		0.24	x	0.7	= [9.28	(79)
Southwest _{0.9x} 0.77	x	2.19	X	119.01		0.24	x [0.7	= [30.34	(79)
Southwest _{0.9x} 0.77	x	0.75	X	119.01		0.24	x	0.7	= [10.39	(79)
Southwest _{0.9x} 0.77	x	2.19	X	118.15		0.24	x	0.7	= [30.12	(79)
Southwest _{0.9x} 0.77	x	0.75	X	118.15		0.24	x	0.7	= [10.32	(79)
Southwest _{0.9x} 0.77	X	2.19	X	113.91		0.24	X	0.7	= [29.04	(79)
Southwest _{0.9x} 0.77	X	0.75	X	113.91		0.24	X	0.7	= [9.95	(79)
Southwest _{0.9x} 0.77	X	2.19	X	104.39		0.24	X	0.7	= [26.62	(79)
Southwest _{0.9x} 0.77	X	0.75	X	104.39		0.24	X	0.7	= [9.12	(79)
Southwest _{0.9x} 0.77	x	2.19	X	92.85		0.24	X	0.7	= [23.67	(79)
Southwest _{0.9x} 0.77	X	0.75	X	92.85		0.24	X	0.7	= [8.11	(79)
Southwest _{0.9x} 0.77	X	2.19	X	69.27		0.24	X	0.7	= [17.66	(79)
Southwest _{0.9x} 0.77	X	0.75	X	69.27		0.24	x	0.7	= [6.05	(79)
Southwest _{0.9x} 0.77	X	2.19	X	44.07		0.24	X	0.7	=	11.24	(79)
Southwest _{0.9x} 0.77	X	0.75	X	44.07		0.24	X	0.7	= [3.85	(79)
Southwest _{0.9x} 0.77	X	2.19	X	31.49		0.24	X	0.7	= [8.03	(79)
Southwest _{0.9x} 0.77	X	0.75	X	31.49		0.24	X	0.7	= [2.75	(79)
Solar gains in watts, calcul (83)m= 31.38 59.69 98	$\overline{}$	for each mon		02.57 190.66		n = Sum(74)m . 5.65 115.73	(82)m 70.44	38.72	26.12		(83)
Total gains – internal and s	solar	(84)m = (73) r	n + (83)m , watts		<u> </u>	I	1			
(84)m= 510.44 535.42 557	'.92	584.32 602.3	37 5	589.22 563.69	9 536	5.28 509.46	489.22	485.41	493.73		(84)
<u> </u>	•		•		•			•			

7. Me	ean inter	nal temp	perature	(heating	season)								
Temp	erature	during h	neating p	eriods ir	n the livii	ng area	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilis	ation fac	tor for g	ains for	living are	ea, h1,m	(see Ta	ble 9a)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98	0.95	0.89	0.75	0.59	0.64	0.84	0.95	0.98	0.99		(86)
Mear	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.61	19.73	19.97	20.31	20.64	20.88	20.97	20.95	20.79	20.39	19.95	19.59		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilis	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.99	0.98	0.97	0.93	0.84	0.65	0.44	0.49	0.76	0.93	0.98	0.99		(89)
Mear	n interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)				
(90)m=	17.91	18.09	18.43	18.93	19.37	19.65	19.71	19.71	19.56	19.05	18.41	17.88		(90)
		-	-	-	-	-	-	-	1	fLA = Livin	g area ÷ (4) =	0.26	(91)
Mear	n interna	l temper	ature (fo	or the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	18.35	18.51	18.83	19.28	19.7	19.96	20.04	20.03	19.88	19.39	18.81	18.32		(92)
Apply	/ adjustn	nent to t	he mear	n interna	l temper	ature fro	m Table	4e, whe	ere appro	opriate	!			
(93)m=	18.35	18.51	18.83	19.28	19.7	19.96	20.04	20.03	19.88	19.39	18.81	18.32		(93)
8. Sp	ace hea	ting requ	uirement	t										
				•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u		l	T T	using Ta		l .					l			
L ICT:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm	1	I 0.04	0.07			0.77		0.07			(04)
(94)m=	0.98	0.97	0.96	0.92	0.84	0.67	0.48	0.52	0.77	0.92	0.97	0.98		(94)
		i	- `	4)m x (8	 	000.44	000.0	004.00	000.07	450.00	470.00	105.0		(OE)
(95)m=	500.55	521.82	535.56	538.76	503.56	393.11	269.6	281.23	392.67	452.22	470.63	485.3		(95)
	4.3	age exte	6.5	8.9	e from Ta	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
(96)m=		<u> </u>	ļ	Į	l .	<u> </u>	<u> </u>	<u> </u>	!	<u> </u>	7.1	4.2		(30)
	1157.97			845.56	erature, 650.25	432.45	276.94	292.05	467.37	715	955.26	1155.84		(97)
					nonth, k\							1133.04		(01)
(98)m=	489.12	401.76	354.92	220.9	109.13	0	0.02	0	0	195.51	348.93	498.89		
(00)111=	100.12	101.10	00 1102		100.10			<u> </u>		(kWh/year			2619.15	(98)
Cnaa	a haatin	a roauir	omant in	. IdA/b/mi	2/voor			1010	ii pei yeai	(KVVII/yCai) = Odin(3	O)15,912 —		=
•		• .		kWh/m²	year							l	47.1	(99)
		Ĭ	quiremer											
Calcu					See Tal				0	0.1	NI.			
Heet	Jan	Feb	Mar	Apr	May F°C into	Jun	Jul	Aug	Sep	Oct	Nov	Dec 10)		
(100)m=		e Lm (ca	liculated 0	using 2	0 Inter	757.83	596.59	611.66	ernai ten	nperatur 0	e from 1	able 10) 0		(100)
, ,	ation fac					131.83	590.59	011.00				U		(100)
(101)m=		0		0	0	0.72	0.81	0.77	0	0	0	0		(101)
(101)111-					<u>`</u>	L 0.72	L 0.01	L .,,						(10.)

Useful loss, hmLm (Watts) = (100)m x (101)m					
(102)m= 0 0 0 0 0 546.9 481.43	472.55 0	0 0	0		(102)
Gains (solar gains calculated for applicable weather region, see	Table 10)	· · · · · · · · · · · · · · · · · · ·			
(103)m= 0 0 0 0 623.42 595.88	562.73 0	0 0	0		(103)
Space cooling requirement for month, whole dwelling, continuo set (104)m to zero if (104)m < 3 × (98)m	us (kWh) = 0.024	1 x [(103)m – (1	102)m]x(4	41)m	
(104)m= 0 0 0 0 0 85.15	67.09 0	0 0	0		
			=	152.24	(104)
Cooled fraction Intermittency factor (Table 10b)	f C = co	ooled area ÷ (4	·) =	0.68	(105)
(106)m= 0 0 0 0 0.25 0.25	0.25 0	0 0	0		
	Total =	: Sum(104)	=	0	(106)
Space cooling requirement for month = (104) m × (105) × (106) m	1 1				
(107)m= 0 0 0 0 0 14.55	11.46 0	0 0	0		7(407)
Space cooling requirement in k/M/h/m²/yeer			=	26.01	(107)
Space cooling requirement in kWh/m²/year 9b. Energy requirements – Community heating scheme	(107) ÷	(4) =		0.47	(108)
This part is used for space heating, space cooling or water heating	ng provided by a c	community sch	eme.		
Fraction of space heat from secondary/supplementary heating (• .	•		0	(301)
Fraction of space heat from community system 1 – (301) =				1	(302)
The community scheme may obtain heat from several sources. The procedure a		to four other heat	sources; the l	atter	
includes boilers, heat pumps, geothermal and waste heat from power stations. S Fraction of heat from Community CHP	ee Appendix C.			0.13	(303a)
Fraction of community heat from heat source 2				0.87	(303b)
Fraction of total space heat from Community CHP		(302) x (303a	a) =	0.13	(304a)
Fraction of total space heat from community heat source 2		(302) x (303b	0) =	0.87	(304b)
Factor for control and charging method (Table 4c(3)) for commu	nity heating systen	m		1	(305)
Distribution loss factor (Table 12c) for community heating system	า			1.05	(306)
Space heating				kWh/yeaı	_
Annual space heating requirement				2619.15	
Space heat from Community CHP	(98) x (304a	a) x (305) x (306) =		357.51	(307a)
Space heat from heat source 2	(98) x (304b)	o) x (305) x (306) =		2392.6	(307b)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or App	pendix E)		0	(308
Space heating requirement from secondary/supplementary systematics	em (98) x (301)	x 100 ÷ (308) =		0	(309)
Water heating					_
Annual water heating requirement				1882.19	
If DHW from community scheme: Water heat from Community CHP	(64) x (303a)	a) x (305) x (306) =		256.92	(310a)
Water heat from heat source 2	(64) x (303b)	o) x (305) x (306) =		1719.38	(310b)
Electricity used for heat distribution	0.01 × [(307a)(3	307e) + (310a)(3	310e)] =	47.26	(313)
Cooling System Energy Efficiency Ratio				4.73	(314)

Space cooling (if there is a fixed cooling system	n, if not enter 0)	= (107) ÷ (314) =	5.5 (315)
Electricity for pumps and fans within dwelling (7 mechanical ventilation - balanced, extract or po	•	de	92.61 (330a)
warm air heating system fans			0 (330b)
pump for solar water heating			0 (330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	92.61 (331)
Energy for lighting (calculated in Appendix L)			254.67 (332)
Electricity generated by PVs (Appendix M) (neg	gative quantity)		-118.8 (333)
Electricity generated by wind turbine (Appendix	M) (negative quantity)		0 (334)
10b. Fuel costs – Community heating scheme			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating from CHP	(307a) x	2.97 x 0.01 =	10.62 (340a)
Space heating from heat source 2	(307b) x	4.24 x 0.01 =	101.45 (340b)
Water heating from CHP	(310a) x	2.97 x 0.01 =	7.63 (342a)
Water heating from heat source 2	(310b) x	4.24 x 0.01 =	72.9 (342b)
		Fuel Price	
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	0.73 (348)
Pumps and fans	(331)	13.19 × 0.01 =	12.21 (349)
Energy for lighting	(332)	13.19 x 0.01 =	33.59 (350)
Additional standing charges (Table 12)			120 (351)
Energy saving/generation technologies Item 1		13.19 x 0.01 =	-15.67 (352)
Total energy cost = (340a)(342e) + (345)(354) =		343.46 (355)
11b. SAP rating - Community heating scheme			
Energy cost deflator (Table 12)			0.42 (356)
Energy cost factor (ECF) [(355) x	(356)] ÷ [(4) + 45.0] =		1.43 (357)
SAP rating (section12)			80 (358)
12b. CO2 Emissions – Community heating sch	eme		(0.2.1)
Electrical efficiency of CHP unit			30.6 (361)
Heat efficiency of CHP unit	_		63 (362)
		nergy Emission factor Wh/year kg CO2/kWh	kg CO2/year
Space heating from CHP) (307a) × 100	÷ (362) =	567.48 × 0.22	122.58 (363)
less credit emissions for electricity -(307a) × (36	31) ÷ (362) =	173.65 × 0.52	-90.12 (364)
Water heated by CHP (310a) x 100	÷ (362) =	407.81 × 0.22	88.09 (365)
less credit emissions for electricity -(310a) × (36	(362) =	124.79 × 0.52	-64.77 (366)
Efficiency of heat source 2 (%)	If there is CHP using two fu	els repeat (363) to (366) for the second fu	96.7 (367b)

			1 1		7
CO2 associated with heat source 2	307b)+(310b)] x 100 ÷ (367b) x	0.22	=	918.5	(368)
Electrical energy for heat distribution	[(313) x	0.52	=	24.53	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)		=	998.8	(373)
CO2 associated with space heating (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater or insta	antaneous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =			998.8	(376)
CO2 associated with space cooling	(315) x	0.52	=	2.86	(377)
CO2 associated with electricity for pumps and fans within	dwelling (331)) x	0.52	=	48.06	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	132.18	(379)
Energy saving/generation technologies (333) to (334) as a Item 1	· ·	0.52 x 0.0	01 =	-61.66	(380)
Total CO2, kg/year sum of (376)(382) =	=			1120.24	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =				20.14	(384)
El rating (section 14)				85.08	(385)
13b. Primary Energy – Community heating scheme					7
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Primary factor		Energy Vh/year	
	_			•	
Space heating from CHP) $(307a) \times 100 \div (362) =$	567.48 ×	1.22		692.33	(363)
Space heating from CHP) $(307a) \times 100 \div (362) =$ less credit emissions for electricity $-(307a) \times (361) \div (362) =$	567.48 X 173.65 X	1.22 3.07]]	692.33 -533.11	(363)
Space meaning mann character ,	007.40]]		」 ```
less credit emissions for electricity $-(307a) \times (361) \div (362) =$	173.65 X	3.07		-533.11	(364)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$	173.65 X 407.81 X	3.07 1.22 3.07	 	-533.11 497.53	(364)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH	173.65 × 407.81 × 124.79 ×	3.07 1.22 3.07	 	-533.11 497.53 -383.1	(364) (365) (366)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH	173.65 X 407.81 X 124.79 X IP using two fuels repeat (363) to (3	3.07 1.22 3.07 366) for the secon	nd fuel	-533.11 497.53 -383.1 96.7	(364) (365) (366) (367b)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2	173.65	3.07 1.22 3.07 366) for the secon	and fuel =	-533.11 497.53 -383.1 96.7 5187.82	(364) (365) (366) (367b) (368)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(310a) \times (361) \times (362) =	173.65	3.07 1.22 3.07 3.66) for the second 1.22		-533.11 497.53 -383.1 96.7 5187.82 145.1	(364) (365) (366) (367b) (368) (372)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(310a) \times (361) \times (362) = (310a) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) = (310a) \times (362) \times (362) \times (362) \times (362) = (310a) \times (362)	173.65	3.07 1.22 3.07 3.66) for the second 1.22		-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56	(364) (365) (366) (367b) (368) (372) (373)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(32) Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherway)	173.65	3.07 1.22 3.07 366) for the secon		-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(364) (365) (366) (367b) (368) (372) (373) (373)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(32) Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherwise) Energy associated with space heating (secondary)	173.65	3.07 1.22 3.07 366) for the second 1.22		-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(364) (365) (366) (367b) (368) (372) (373) (373) (374)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(32) Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherwise) Energy associated with space heating (secondary) Energy associated with water from immersion heater or instance of the specified of the secondary)	173.65	3.07 1.22 3.07 366) for the second 1.22		-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 5606.56	(364) (365) (366) (367b) (368) (372) (373) (373) (374) (375)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 [(3) Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherw Energy associated with space heating (secondary) Energy associated with water from immersion heater or instance of the space of	173.65	3.07 1.22 3.07 3.66) for the second 1.22 0 1.22		-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 0 0 5606.56	(364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherw Energy associated with space heating (secondary) Energy associated with water from immersion heater or instance of the space of the space and water heating Energy associated with space cooling	173.65	3.07 1.22 3.07 3.66) for the secon 1.22 0 1.22 3.07	ad fuel = = =	-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 0 0 5606.56	(364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376) (377)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$ Water heated by CHP $(310a) \times 100 \div (362) =$ less credit emissions for electricity $-(310a) \times (361) \div (362) =$ Efficiency of heat source 2 (%) If there is CH Energy associated with heat source 2 Electrical energy for heat distribution Total Energy associated with community systems if it is negative set (373) to zero (unless specified otherw Energy associated with space heating (secondary) Energy associated with water from immersion heater or instal Energy associated with space and water heating Energy associated with space cooling Energy associated with electricity for pumps and fans with	173.65	3.07 1.22 3.07 3.07 3.07 3.07 0 1.22 3.07 3.07	and fuel	-533.11 497.53 -383.1 96.7 5187.82 145.1 5606.56 0 0 5606.56 16.9 284.3	(364) (365) (366) (367b) (368) (372) (373) (373) (374) (375) (376) (377) (378)

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2	2012			a Num are Vei				016363 on: 1.0.4.10	
		Р	roperty	Address	: Flat 0-1	1-Lean				
Address:										
1. Overall dwelling dime	nsions:		Λ	n/m²\		Av. Ua	iaht/m\		Valuma/m³	`
Basement				a(m²) 13.25	(1a) x		ight(m) 3.1	(2a) =	Volume(m³	(3a)
Ground floor				3.89	(1b) x	2	2.6](2b) =	166.11	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+	(1e)+(1r	n)	07.14	(4)			_		
Dwelling volume		. , , ,	´ <u></u>)+(3c)+(3c	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	r
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent far	ns					0	X ·	10 =	0	(7a)
Number of passive vents						0	x	10 =	0	(7b)
Number of flueless gas fin	res				Ī	0	x 4	40 =	0	(7c)
								Air ob	anges per ho	
Infiltration due to chimney	ve flues and fans -	- (6a)+(6b)+(7	/a)ェ(7h)ェ(7c) -	Г			1		_
If a pressurisation test has be	•				continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in th	ne dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timb	er frame or	0.35 fo	r mason	ry constr	uction			0	(11)
if both types of wall are pr		rresponding to	the great	ter wall are	a (after			'		
deducting areas of opening If suspended wooden f	= :	ealed) or 0.	.1 (seale	ed). else	enter 0				0	(12)
If no draught lobby, ent	•	,	(000	, c.cc	00.				0	(13)
Percentage of windows	•								0	(14)
Window infiltration	Ū	• • •		0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in	cubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabili	ity value, then (18) =	= [(17) ÷ 20]+(8	B), otherw	ise (18) =	(16)				0.15	(18)
Air permeability value applie	s if a pressurisation test	has been dor	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	d								2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorporat	ing shelter factor			(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind sp	eed						,	•	
Jan Feb	Mar Apr Ma	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A.P. ata I.'s Clear Connect	. /.!!. '	(1	-16	1 1.1.		(04 -)	(00 -)				l	
Adjusted infiltration rat	e (allowi _{0.16}	ng for sr 0.14	0.14	a wina s	peea) =	0.12	(22a)m _{0.13}	0.14	0.14	0.15		
Calculate effective air		-				0.12	0.13	0.14	0.14	0.15		
If mechanical ventila	ition:										0.5	(23a)
If exhaust air heat pump	using Appe	endix N, (2	3b) = (23a) × Fmv (e	equation (N5)) , othe	rwise (23b) = (23a)			0.5	(23b)
If balanced with heat reco	overy: effic	iency in %	allowing fo	or in-use fa	actor (fror	n Table 4h) =				76.5	(23c)
a) If balanced mecha					<u> </u>	- 	ŕ	, 		``	÷ 100]	(5.4.)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mecha						- ^ ` ` 	í `	<u> </u>			l	(0.41-)
(24b)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house ex if (22b)m < 0.5 x			•	-				5 v (22h	.\			
(24c)m = 0 0	0	0	0 = (230)	0	0	$\frac{1}{100} = (221)$	0	0	0	0		(24c)
d) If natural ventilation										Ů		(= 15)
if (22b)m = 1, the								0.5]				
(24d)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change	rate - er	iter (24a	or (24b	o) or (240	c) or (24	ld) in box	(25)				'	
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losses and he	eat loss r	paramete	er:									
3. Heat losses and he	SS	Openin	gs	Net Ar		U-valı		AXU	()	k-value		A X k
ELEMENT Gros	SS		gs	A ,n	n²	W/m2	K	(W/I	<)	k-value kJ/m²-ł		kJ/K
ELEMENT Gros area Doors	SS	Openin	gs	A ,n	m² x	W/m2	K =	(W/F	<) 			kJ/K (26)
ELEMENT Gros area Doors Windows Type 1	SS	Openin	gs	A ,n	m ² x	W/m2 1.2 /[1/(1.2)+	= 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2	SS	Openin	gs	A ,n 2.6 13.52 2.73	m² x x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] =	3.12 15.48 3.13	<) 			(26) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16	x x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gros area Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/H 3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54 3.51	x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02				(26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25	x1 x1 x1 x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575				(26) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	ss (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509				(26) (27) (27) (27) (27) (27) (28) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	ss (m²)	Openin	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25	x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575				(26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2	ss (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509				(26) (27) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 77.3 Walls Type2 20.6 Walls Type3	ss (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				(26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type4	ss (m²)	34.06 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68	x1 x1 x1 x1 x1 x1 x1 x2 x3 x4 <td>W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15</td> <td>0.04] = 0.04]</td> <td>(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1</td> <td></td> <td></td> <td></td> <td>(26) (27) (27) (27) (27) (27) (27) (28) (28) (29)</td>	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04]	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1				(26) (27) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 43.	32 38 4	34.00 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	x1 x1 x1 x1 x1 x1 x1 x2 x3 x4 <td>W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15</td> <td>0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =</td> <td>(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51</td> <td></td> <td></td> <td></td> <td>(26) (27) (27) (27) (27) (27) (28) (28) (29) (29)</td>	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.4	SS (m²) 32	34.00 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22	x1 x1 x1 x1 x1 x1 x2 x3 x4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.2	SS (m²) 32 38 4 22 7	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	x1 x1 x1 x1 x1 x1 x2 x3 x4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type 1 77.3 Walls Type 2 Walls Type 2 Walls Type 2 Walls Type 3 Walls Type 4 Walls Type 4 Walls Type 4 Walls Type 5 Roof Type 1 11.4	32 38 4 22 7	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42	x x1 x1 x1 x1 x1 x1 x2 x x x x x x x x	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 Roof Type2 4.83	32 38 4 22 7	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42 4.83	x x1 x1 x1 x1 x1 x1 x2 x x x x x x x x	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (30) (30)

Party of	eilina					59.06	,				Г			(32b)
-	•	roof wind	ows, use e	effective wi	indow U-va			formula 1	/[(1/U-valu	e)+0.04] a	L as given in	paragraph		(320)
			sides of in		ls and part	titions		(00) (00)	. (00)			г		_
			= S (A x	U)				(26)(30)	, ,	(00) (0)	a) (00)	(00.)	71.12	(33)
		Cm = S(TE 4) '.	. 1. 1/217			., ,	. , ,	2) + (32a).	(32e) = [34247.85	(34)
		•	•		,	n kJ/m²K		o o io o ly 4h c		tive Value		blo 1f	250	(35)
	•		ere tne de tailed calci		CONSTRUCT	ion are not	r known pr	ecisely the	indicative	values of	TMP in Ta	able 11		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<						36.66	(36)
if details	of therma	ıl bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea		alculated	d monthly	У	ı	i	i		= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		_
Heat lo	oss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	133.24	(39)
(40)m=	1.26	1.26	1.26	1.24	1.24	1.23	1.23	1.22	1.23	1.24	1.25	1.25		
			<u> </u>	<u> </u>	<u> </u>	<u> </u>			/	Average =	Sum(40) ₁ .	12 /12=	1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)	i	i	r	r			i	· · · · · ·		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m =	31	28	31	30	31	30	1 04							(41)
			"] 30] 31	30	31	31	30	31	30	31		(41)
			01] 30] 31	30	31	31	30	31	30	31		(41)
4. Wa	iter heat		rgy requi			30	31	31	30	31	30	kWh/ye	ear:	(41)
			rgy requi			30	31	31	30	31			ear:	
Assum if TF	ied occu A > 13.9	ing ener	rgy requi	irement:		30 349 x (TF					2	kWh/ye	ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ing ener pancy, I 9, N = 1 9, N = 1	rgy requi N + 1.76 x	irement:	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (T		9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ing energipancy, I D, N = 1 D, N = 1 e hot wa	rgy requi N + 1.76 x	irement: [1 - exp	-(-0.0003 es per da		FA -13.9) erage =)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ing energy, I pancy, I 9, N = 1 9, N = 1 e hot was al average	rgy requi N + 1.76 x ater usag hot water	irement: [1 - exp ge in litre usage by:	(-0.0003 es per da 5% if the a	349 x (TF	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ar:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av dwelling is thot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month	es per da 5% if the d vater use, I	349 x (TF ay Vd,av welling is hot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av dwelling is thot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage ir	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	irement: [1 - exp ge in litre usage by a day (all w Apr ach month	es per da 5% if the a rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (7 + 36 a water us Sep	ΓFA -13. se target o Oct 102.63 Fotal = Su	9) 100 Nov 106.65 m(44)112 =	kWh/ye .8 0.62 Dec 110.68	ear: 1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual of that 125 Jan er usage in	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61	es per da 5% if the a vater use, I May Vd,m = fa 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	ΓFA -13. See target of Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annua e that 125 Jan er usage ir	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	irement: [1 - exp ge in litre usage by a day (all w Apr ach month	es per da 5% if the a rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us Sep 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63 used - calc	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 culated mo	o(-0.0003 es per da 5% if the of vater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m=	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63 used - calc	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 culated mo	o(-0.0003 es per da 5% if the of vater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,av fwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage	ing energy pancy, I pancy, I pancy, I pancy, I pancy p	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea 102.63 used - calc 148.13	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 [129.15] [13.37]	es per da 5% if the day atter use, I May Vd,m = fact 94.58 conthly = 4. 123.92 co hot water 18.59	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthal 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum	ing energy, Inpancy,	rgy requivalent of the second	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 [129.15] for use (not) 19.37 and any so	es per da 5% if the of vater use, I May Vd, m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave fwelling is a hot and con Jun ctor from T 90.56 190 x Vd,re 106.93 r storage), 16.04	erage = designed to ld) Jul Fable 1c x 90.56 m x nm x E 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(42) (43) (44)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If comit	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy pancy, I pancy, I pancy, I pancy, I pancy parce p	rgy required to the second required to the second reperson per second reperson per second reperson reperson reperson per second reperson r	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 for use (not 19.37 and any so ank in dw	es per da 5% if the of water use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water velling, e	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instan (46)m= Water Storag If comit Othery	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy, Ipancy, Ip	rgy required to the second required to the second reperson per second reperson per second reperson reperson reperson per second reperson r	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 for use (not 19.37 and any so ank in dw	es per da 5% if the of water use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water velling, e	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ined occur in A > 13.9 If A £ 13.9 If average the annual of that 125 If average in a 110.68	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy energy Feb palitres per 106.65 hot water 143.55 ater heatin 21.53 loss: e (litres) eating a pater stored loss:	rgy required in the state of th	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 [29.15] [20.15] [30.15] [40.16] [50.16] [60.16] [60.16] [70.1	es per da 5% if the a vater use, I May Vd, m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water use, III.	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to ld) Jul Fable 1c x 90.56 m x nm x D 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96 47)	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)

	om water	ctorago	k\N/b/v	oor			(48) x (49	١ _				1	(50)
b) If manufac		•	•		or is not		(40) X (40)	, –			0		(30)
Hot water sto			•								0		(51)
If community	_		on 4.3									1	
Volume facto			O.								0		(52)
Temperature											0		(53)
Energy lost fr		_	, kWh/ye	ear			(47) x (51) x (52) x (53) =	-	0		(54)
Enter (50) or	. , .	,		.1				,			0		(55)
Water storage	e loss cal	culated f	or each	month			((56)m = ((55) × (41)ı	m			•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0	<u> </u>	(56)
If cylinder contai	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	/)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circu	it loss (ar	nnual) fro	m Table	3							0		(58)
Primary circu	it loss cal	culated f	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tabl	le H5 if t	here is s	olar wat	er heati	ng and a	cylinde	r thermo	stat)		•	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m = $($	(60) ÷ 36	65 × (41))m						
(61)m= 50.96	46.03	50.96	48.63	48.2	44.66	46.15	48.2	48.63	50.96	49.32	50.96		(61)
Total heat red	quired for	water he	eating ca	alculated	for eacl	h month	(62)m =	: 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 215.09	`	199.09	177.77	172.12	151.59	145.24	161.9	163.69	185.05	195.69	209.91		(62)
Solar DHW input	t calculated	using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contributi	ion to wate	r heating)	l	
(add addition											0,		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	l	(63)
	1				-		-	0	U	0	0		(63)
Output from v	vater hea	ter				<u> </u>		0	0				(03)
Output from v (64)m= 215.09	1	ter 199.09	177.77	172.12	151.59	145.24	161.9	163.69	185.05	195.69	209.91]	(03)
	1	T 1	177.77				161.9	163.69	185.05	195.69	209.91	2166.73	(64)
(64)m= 215.09	189.58	199.09		172.12	151.59	145.24	161.9 Outp	163.69 out from wa	185.05	195.69	209.91		•
(64)m= 215.09 Heat gains from	189.58 om water	199.09	kWh/mo	172.12 onth 0.25	151.59 5 ´ [0.85	145.24 × (45)m	161.9 Outp + (61)m	163.69 out from wa	185.05 ater heater ([(46)m	195.69 r (annual) ₁ + (57)m	209.91 + (59)m		•
(64)m= 215.09 Heat gains fro (65)m= 67.31	189.58 om water 59.24	199.09 heating, 61.99	kWh/mo	172.12 onth 0.25	151.59 5 ´ [0.85 46.72	145.24 × (45)m	161.9 Outp + (61)m 49.86	163.69 out from water [163.69] + 0.8 × 50.42	185.05 ater heater ([(46)m 57.33	195.69 r (annual) + (57)m 61	209.91 + (59)m 65.59]	(64)
(64)m= 215.09 Heat gains from (65)m= 67.31 include (57)	om water 59.24	heating, 61.99	kWh/mo 55.1 of (65)m	172.12 onth 0.25 53.25 only if c	151.59 5 ´ [0.85 46.72	145.24 × (45)m	161.9 Outp + (61)m 49.86	163.69 out from water [163.69] + 0.8 × 50.42	185.05 ater heater ([(46)m 57.33	195.69 r (annual) + (57)m 61	209.91 + (59)m 65.59]	(64)
(64)m= 215.09 Heat gains from (65)m= 67.31 include (57) 5. Internal of	om water 59.24 c)m in calc	heating, 61.99 culation of	kWh/mo 55.1 of (65)m	172.12 onth 0.25 53.25 only if c	151.59 5 ´ [0.85 46.72	145.24 × (45)m	161.9 Outp + (61)m 49.86	163.69 out from water [163.69] + 0.8 × 50.42	185.05 ater heater ([(46)m 57.33	195.69 r (annual) + (57)m 61	209.91 + (59)m 65.59]	(64)
Heat gains from (65)m= 67.31 include (57). Internal gains gain	om water 59.24 c)m in calc gains (see	heating, 61.99 culation of Table 5	kWh/mo 55.1 of (65)m 5 and 5a	172.12 onth 0.25 53.25 only if c	151.59 5 ´ [0.85 46.72 ylinder is	145.24 × (45)m 44.48 s in the o	161.9 Outp + (61)m 49.86 dwelling	163.69 out from wa n] + 0.8 x 50.42 or hot w	185.05 ater heater ([(46)m 57.33 ater is fr	195.69 r (annual) + (57)m 61 rom com	209.91 + (59)m 65.59 munity h]	(64)
Heat gains from (65)m= 67.31 include (57) 5. Internal of Metabolic gain Jan	om water 59.24 c)m in calc gains (see	heating, 61.99 culation of Table 5 5), Watt	kWh/mo 55.1 of (65)m and 5a ts Apr	172.12 onth 0.25 53.25 only if contributions May	151.59 5 ´ [0.85 46.72 ylinder is	145.24 × (45)m 44.48 s in the o	161.9 Outp 1 + (61)m 49.86 dwelling	163.69 out from wa n] + 0.8 > 50.42 or hot w	185.05 ater heater ([(46)m) 57.33 ater is fr	195.69 r (annual) + (57)m 61 rom com	209.91 + (59)m 65.59 munity h]	(64) (65)
(64)m= 215.09 Heat gains from (65)m= 67.31 include (57) 5. Internal gain Jan (66)m= 139.83	om water 59.24 c) m in calc gains (see ins (Table Feb 139.83	199.09 heating, 61.99 culation of the Table 5 e 5), Watter Mar 139.83	kWh/mo 55.1 of (65)m and 5a ts Apr 139.83	172.12 onth 0.25 53.25 only if control May 139.83	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83	145.24 × (45)m 44.48 s in the of Jul 139.83	161.9 Outp 1 + (61)m 49.86 dwelling Aug 139.83	163.69 out from was 1 + 0.8 x 50.42 or hot w Sep 139.83	185.05 ater heater ([(46)m 57.33 ater is fr	195.69 r (annual) + (57)m 61 rom com	209.91 + (59)m 65.59 munity h]	(64)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains	om water 59.24 c)m in calc gains (see Ins (Table Feb 139.83 s (calcula	heating, 61.99 culation of Table 5 e 5), Watt Mar 139.83	kWh/mo 55.1 of (65)m 6 and 5a ts Apr 139.83	172.12 onth 0.25 53.25 only if c : May 139.83 L, equati	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83	145.24 × (45)m 44.48 s in the of Jul 139.83 r L9a), a	161.9 Outp + (61)m 49.86 dwelling Aug 139.83 Iso see	163.69 out from water and + 0.8 x 50.42 or hot w Sep 139.83 Table 5	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83	195.69 r (annual) + (57)m 61 rom com Nov 139.83	209.91 + (59)m 65.59 munity h]	(65) (66)
Heat gains from (65)m= 67.31 include (57) 5. Internal of Jan (66)m= 139.83 Lighting gains (67)m= 23.84	om water 59.24 c)m in calc gains (see ns (Table Feb 139.83 s (calcula 21.17	heating, 61.99 culation of Table 5 5), Wate Mar 139.83 ted in Ap	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix	172.12 onth 0.25 53.25 only if color May 139.83 L, equati 9.74	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 5 on L9 or 8.23	145.24 x (45)m 44.48 s in the of Jul 139.83 r L9a), a 8.89	161.9 Outp 1 + (61)m 49.86 dwelling 139.83 Iso see	163.69 out from water a) + 0.8 × 50.42 or hot w Sep 139.83 Table 5 15.51	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83	195.69 r (annual) + (57)m 61 rom com	209.91 + (59)m 65.59 munity h]	(64) (65)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains	om water 59.24 c)m in calc gains (see 139.83 s (calcula 21.17 ains (calc	heating, 61.99 culation of E Table 5 E 5), Wate Mar 139.83 ted in Ap 17.22	kWh/mo 55.1 of (65)m and 5a ts Apr 139.83 opendix 13.04	172.12 onth 0.25 53.25 only if c : May 139.83 L, equati 9.74 dix L, equ	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 ion L9 of 8.23 uation L	145.24 × (45)m 44.48 s in the of the control of	161.9 Outp + (61)m 49.86 dwelling Aug 139.83 lso see 11.55 3a), also	163.69 out from wa n] + 0.8 x 50.42 or hot w Sep 139.83 Table 5 15.51 o see Tal	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83	195.69 r (annual) + (57)m 61 rom com Nov 139.83	209.91 + (59)m 65.59 munity h Dec 139.83]	(65) (66) (67)
Heat gains from (65)m= 67.31 include (57) 5. Internal of Jan (66)m= 139.83 Lighting gains (67)m= 23.84	om water 59.24 c)m in calc gains (see 139.83 s (calcula 21.17 ains (calc	heating, 61.99 culation of Table 5 5), Wate Mar 139.83 ted in Ap	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix	172.12 onth 0.25 53.25 only if color May 139.83 L, equati 9.74	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 5 on L9 or 8.23	145.24 x (45)m 44.48 s in the of Jul 139.83 r L9a), a 8.89	161.9 Outp 1 + (61)m 49.86 dwelling 139.83 Iso see	163.69 out from water a) + 0.8 × 50.42 or hot w Sep 139.83 Table 5 15.51	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83	195.69 r (annual) + (57)m 61 rom com Nov 139.83	209.91 + (59)m 65.59 munity h]	(65) (66)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains	om water 59.24 c)m in calc gains (see Feb 3 139.83 s (calcula 21.17 ains (calc	heating, 61.99 culation of Table 5 e 5), Watt Mar 139.83 ted in Ap 17.22 culated in 263.16	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix 13.04 Appendix Appendix 148.28	172.12 onth 0.25 53.25 only if c : May 139.83 L, equati 9.74 dix L, equ 229.49	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 ion L9 of 8.23 uation L 211.83	145.24 × (45)m 44.48 s in the of 139.83 r L9a), a 8.89 13 or L1 200.03	161.9 Outp + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26	163.69 out from war n] + 0.8 x 50.42 or hot w Sep 139.83 Table 5 15.51 o see Tal 204.25	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13	195.69 r (annual) + (57)m 61 rom com Nov 139.83	209.91 + (59)m 65.59 munity h Dec 139.83]	(65) (66) (67)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains (68)m= 267.38	om water 59.24 c)m in calc gains (see Feb 3 139.83 s (calcula 21.17 ains (calc	heating, 61.99 culation of Table 5 e 5), Watt Mar 139.83 ted in Ap 17.22 culated in 263.16	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix 13.04 Appendix Appendix 148.28	172.12 onth 0.25 53.25 only if c : May 139.83 L, equati 9.74 dix L, equ 229.49	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 ion L9 of 8.23 uation L 211.83	145.24 × (45)m 44.48 s in the of 139.83 r L9a), a 8.89 13 or L1 200.03	161.9 Outp + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26	163.69 out from war n] + 0.8 x 50.42 or hot w Sep 139.83 Table 5 15.51 o see Tal 204.25	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13	195.69 r (annual) + (57)m 61 rom com Nov 139.83	209.91 + (59)m 65.59 munity h Dec 139.83]	(65) (66) (67)
Heat gains from (65)m= 67.31 include (57) 5. Internal of Jan (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains (68)m= 267.38 Cooking gains	m water 59.24 m in calc gains (see 139.83 s (calcula 21.17 ains (calc 3 270.16 s (calcula 36.98	heating, 61.99 culation of E Table 5 E 5), Wate Mar 139.83 ted in Ap 17.22 culated in 263.16 ated in Ap 36.98	kWh/mo 55.1 of (65)m and 5a ts Apr 139.83 opendix 13.04 Append 248.28 opendix 36.98	172.12 onth 0.25 53.25 only if controls May 139.83 L, equati 9.74 dix L, equ 229.49 L, equat	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 ion L9 of 8.23 uation L 211.83 ion L15	145.24 x (45)m 44.48 s in the of 139.83 r L9a), a 8.89 13 or L1 200.03 or L15a	161.9 Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also se	163.69 out from water	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13 5	195.69 r (annual) + (57)m 61 rom com Nov 139.83 22.98	209.91 + (59)m 65.59 munity h Dec 139.83 24.5]	(66) (67) (68)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains (68)m= 267.38 Cooking gains (69)m= 36.98	m water 59.24 m in calc gains (see 139.83 s (calcula 21.17 ains (calc 3 270.16 s (calcula 36.98	heating, 61.99 culation of E Table 5 E 5), Wate Mar 139.83 ted in Ap 17.22 culated in 263.16 ated in Ap 36.98	kWh/mo 55.1 of (65)m and 5a ts Apr 139.83 opendix 13.04 Append 248.28 opendix 36.98	172.12 onth 0.25 53.25 only if controls May 139.83 L, equati 9.74 dix L, equ 229.49 L, equat	151.59 5 ´ [0.85 46.72 ylinder is Jun 139.83 ion L9 of 8.23 uation L 211.83 ion L15	145.24 x (45)m 44.48 s in the of 139.83 r L9a), a 8.89 13 or L1 200.03 or L15a	161.9 Outp 1 + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also se	163.69 out from water	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13 5	195.69 r (annual) + (57)m 61 rom com Nov 139.83 22.98	209.91 + (59)m 65.59 munity h Dec 139.83 24.5]	(66) (67) (68)
Heat gains from (65)m= 67.31 include (57) 5. Internal gains (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains (68)m= 267.38 Cooking gains (69)m= 36.98 Pumps and face of the same statement o	om water 59.24 c)m in calc gains (see ns (Table Feb 3 139.83 s (calcula 21.17 ains (calcula 36.98 ans gains 3	heating, 61.99 culation of Table 5 5), Wate Mar 139.83 ted in Ap 17.22 culated in 263.16 ated in Ap 36.98 (Table 5	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix 13.04 Appendix 248.28 opendix 36.98 5a)	172.12 onth 0.25 53.25 only if control May 139.83 L, equati 9.74 dix L, equati 229.49 L, equati 36.98	Jun 139.83 ion L9 o 8.23 uation L 211.83 ion L15 36.98	145.24 x (45)m 44.48 s in the of Jul 139.83 r L9a), a 8.89 13 or L1 200.03 or L15a; 36.98	161.9 Outp + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also se 36.98	163.69 out from war n] + 0.8 x 50.42 or hot w Sep 139.83 Table 5 15.51 o see Tall 204.25 ee Table 36.98	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13 5 36.98	195.69 r (annual) + (57)m 61 rom com Nov 139.83 22.98 237.92	209.91 + (59)m 65.59 munity h Dec 139.83 24.5 255.58]	(66) (67) (68) (69)
Heat gains from (65)m= 67.31 include (57) 5. Internal control (66)m= 139.83 Lighting gains (67)m= 23.84 Appliances gains (68)m= 267.38 Cooking gains (69)m= 36.98 Pumps and factor (70)m= 3	om water 59.24 c)m in calc gains (see ins (Table Feb 3 139.83 s (calcula 21.17 ains (calc 3 270.16 s (calcula 36.98 ans gains 3	heating, 61.99 culation of Table 5 5), Wate Mar 139.83 ted in Ap 17.22 culated in 263.16 ated in Ap 36.98 (Table 5	kWh/mo 55.1 of (65)m 5 and 5a ts Apr 139.83 opendix 13.04 Appendix 248.28 opendix 36.98 5a)	172.12 onth 0.25 53.25 only if control May 139.83 L, equati 9.74 dix L, equati 229.49 L, equati 36.98	Jun 139.83 ion L9 o 8.23 uation L 211.83 ion L15 36.98	145.24 x (45)m 44.48 s in the of Jul 139.83 r L9a), a 8.89 13 or L1 200.03 or L15a; 36.98	161.9 Outp + (61)m 49.86 dwelling 139.83 lso see 11.55 3a), also 197.26), also se 36.98	163.69 out from war n] + 0.8 x 50.42 or hot w Sep 139.83 Table 5 15.51 o see Tall 204.25 ee Table 36.98	185.05 ater heater ([(46)m 57.33 ater is fr Oct 139.83 19.69 ble 5 219.13 5 36.98	195.69 r (annual) + (57)m 61 rom com Nov 139.83 22.98 237.92	209.91 + (59)m 65.59 munity h Dec 139.83 24.5 255.58]	(66) (67) (68) (69)

Water heatin	g gains (T	able 5)													
(72)m= 90.48	``	83.33	76.52	71.58	64	.89	59.79	67.	01	70.02	77.05	84.72	88.16	7	(72)
Total intern	al gains =					(66)	m + (67)m	+ (68	3)m + ((69)m + (7	70)m +	(71)m + (72)	m	_	
(73)m= 449.6	_	431.66	405.79	378.76	352	2.89	336.66	343	.77	357.73	383.83	3 413.57	436.19	7	(73)
6. Solar gai	ns:														
Solar gains are	e calculated	using sola	flux from	Table 6a	and a	associ	ated equa	tions	to con	vert to the	applic	able orientat	ion.		
Orientation:		actor	Area			Flux				9_		FF		Gains	
	Table 6d		m²			Tab	ole 6a		Ta	ble 6b		Table 6c		(W)	
Northeast 0.9	0.54	X	13.	52	x	1	1.28	X		0.24	X	0.7	=	12.46	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	1	1.28	X		0.24	X	0.7	=	3.59	(75)
Northeast 0.9	0.77	X	4.1	6	x	1	1.28	X		0.24	X	0.7	=	5.46	(75)
Northeast 0.9	0.54	X	13.	52	x	2:	2.97	x		0.24	X	0.7	=	25.35	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	2:	2.97	X		0.24	X	0.7	=	7.3	(75)
Northeast 0.9	0.77	X	4.1	6	x	2:	2.97	x		0.24	×	0.7	=	11.12	(75)
Northeast 0.9	0.54	X	13.	52	x	4	1.38	X		0.24	x	0.7	=	45.68	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	4	1.38	x		0.24	X	0.7	=	13.15	(75)
Northeast 0.93	0.77	X	4.1	6	x	4	1.38	x		0.24	x	0.7	=	20.04	(75)
Northeast 0.93	0.54	X	13.	52	x	6	7.96	x		0.24	x	0.7	=	75.02	(75)
Northeast 0.93	0.77	X	2.7	' 3	x	6	7.96	x		0.24	x	0.7	=	21.6	(75)
Northeast 0.9	0.77	X	4.1	6	x [6	7.96	x		0.24	x	0.7	=	32.91	(75)
Northeast 0.9	0.54	X	13.	52	x	9	1.35	x		0.24	x	0.7	=	100.84	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	9	1.35	x		0.24	x	0.7	=	29.03	(75)
Northeast 0.9	0.77	Х	4.1	6	x	9	1.35	x		0.24	x	0.7	=	44.24	(75)
Northeast 0.9	0.54	Х	13.	52	x	9	7.38	x		0.24	x	0.7	=	107.5	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	9	7.38	x		0.24	x	0.7	=	30.95	(75)
Northeast 0.9	0.77	х	4.1	6	x	9	7.38	x		0.24	x	0.7	=	47.17	(75)
Northeast 0.9	0.54	Х	13.	52	x	9	1.1	x		0.24	x	0.7	=	100.56	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	9	1.1	x		0.24	x	0.7	=	28.96	(75)
Northeast 0.9	0.77	X	4.1	6	x [9	1.1	x		0.24	×	0.7	=	44.12	(75)
Northeast 0.9	0.54	X	13.	52	x [7:	2.63	x		0.24	×	0.7	=	80.17	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	7:	2.63	x		0.24	x	0.7	=	23.08	(75)
Northeast 0.9	0.77	X	4.1	6	x [7:	2.63	x		0.24	×	0.7	=	35.17	(75)
Northeast 0.9	0.54	X	13.	52	x [5	0.42	x		0.24	×	0.7	=	55.66	(75)
Northeast 0.9	0.77	X	2.7	' 3	x [5	0.42	x		0.24	×	0.7	=	16.03	(75)
Northeast 0.9	0.77	x	4.1	6	x [5	0.42	x		0.24	×	0.7	_ =	24.42	(75)
Northeast 0.9	0.54	X	13.	52	x [2	8.07	x		0.24	X	0.7	_ =	30.98	(75)
Northeast 0.9	0.77	X	2.7	73	x [2	8.07	x		0.24	x	0.7	<u> </u>	8.92	(75)
Northeast 0.9	0.77	X	4.1	6	x [28	8.07	x		0.24	x	0.7		13.59	(75)
Northeast 0.9	0.54	x	13.	52	x [1	4.2	x		0.24	X	0.7		15.67	(75)
Northeast 0.9	0.77	х	2.7	73	x	1	4.2	x		0.24	×	0.7	=	4.51	(75)

Northeas	t o o [г			1 1			-					(75)
Northeas	<u> </u>	0.77	X	4.1		х Г		14.2] X]		.24	X	0.7		=	6.88	(75)
Northeas	<u> </u>	0.54	×	13.	_	X [9.21	X		.24	×	0.7	_	=	10.17	(75)
	<u> </u>	0.77	X	2.7		× [9.21] X]		.24	×	0.7		=	2.93	(75)
Northeas	<u> </u>	0.77	X	4.1	==	X		9.21] X]	0	.24	_ ×	0.7	\blacksquare	=	4.46	(75)
Southeas	<u> </u>	0.77	X	3.5	51	X	3	36.79	X	0	.24	X	0.7	_	=	15.04	(77)
Southeas	<u> </u>	0.77	X	3.5	51	x [6	52.67	X	0	.24	X	0.7		=	25.61	(77)
Southeas	<u> </u>	0.77	X	3.5	1	x	3	35.75	X	0	.24	X	0.7		=	35.04	(77)
Southeas	<u> </u>	0.77	X	3.5	51	x	1	06.25	X	0	.24	X	0.7		=	43.42	(77)
Southeas	st 0.9x	0.77	X	3.5	51	x	1	19.01	X	0	.24	X	0.7		=	48.63	(77)
Southeas	st 0.9x	0.77	X	3.5	51	x	1	18.15	X	0	.24	X	0.7		=	48.28	(77)
Southeas	st 0.9x	0.77	X	3.5	51	x [1	13.91	X	0	.24	X	0.7		=	46.55	(77)
Southeas	st 0.9x	0.77	X	3.5	51	x	1	04.39	X	0	.24	X	0.7		=	42.66	(77)
Southeas	st _{0.9x}	0.77	X	3.5	51	x [9	92.85	x	0.	.24	x	0.7		=	37.94	(77)
Southeas	st _{0.9x}	0.77	X	3.5	51	x [6	9.27	x	0	.24	x	0.7		=	28.31	(77)
Southeas	st 0.9x	0.77	X	3.5	51	x [2	14.07	x	0	.24	x	0.7		=	18.01	(77)
Southeas	st _{0.9x}	0.77	X	3.5	51	x	3	31.49	x	0	.24	x	0.7		=	12.87	(77)
Southwes	st _{0.9x}	0.77	X	7.5	54	x	3	36.79		0.	.24	x	0.7		=	32.3	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	x	6	62.67		0.	.24	x	0.7		=	55.02	(79)
Southwes	st _{0.9x}	0.77	x	7.5	64	x	8	35.75		0.	.24	x	0.7		=	75.28	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	x	1	06.25	j	0	.24	×	0.7		=	93.27	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	х	1	19.01	1	0	.24	x	0.7		=	104.47	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	×	1	18.15	j '	0	.24	×	0.7		=	103.72	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	×	1	13.91		0	.24	x	0.7		=	99.99	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	x [1	04.39	j	0	.24	x	0.7		=	91.64	(79)
Southwes	st _{0.9x}	0.77	X	7.5	54	×	9	92.85	j '	0	.24	×	0.7		=	81.51	(79)
Southwes	st _{0.9x}	0.77	X	7.5	64	x [6	69.27	i	0.	.24	×	0.7		=	60.81	(79)
Southwes	st _{0.9x}	0.77	X	7.5	4	x [14.07	i	0.	.24	×	0.7		=	38.69	(79)
Southwes	st _{0.9x}	0.77	x	7.5	4	×	3	31.49	i	0.	.24	×	0.7		=	27.64	(79)
Solar ga	ins in v	vatts, ca	lculated	for eac	n month	1			(83)m	ı = Sum	(74)m	(82)m					
(83)m=	68.84	124.4	189.19	266.22	327.21	33	7.62	320.19	272	.73 2	15.56	142.6	1 83.76	58.0)7		(83)
Total gai	ins – in	ternal ar	nd solar	(84)m =	(73)m	+ (8	3)m	, watts								•	
(84)m=	518.48	571.83	620.84	672	705.97	69	0.51	656.84	616	5.5 5	73.28	526.4	3 497.33	494.	26		(84)
7. Meai	n intern	al tempe	erature	(heating	seasor	า)											
		during he					area	from Tal	ole 9,	Th1 (°C)					21	(85)
Utilisati	on fact	or for ga	ins for I	iving are	ea, h1,n	า (se	e Ta	ıble 9a)									
Γ	Jan	Feb	Mar	Apr	May	Ť,	Jun	Jul	A	ug	Sep	Oct	Nov	De	эс		
(86)m=	1	1	1	0.99	0.97	().9	0.77	0.8	32 (0.96	0.99	1	1			(86)
Mean ir	nternal	tempera	iture in l	living are	ea T1 (f	ollov	v ste	ns 3 to 7	7 in T	able 9)C)		•				
	19.5	19.62	19.85	20.18	20.52	_	0.81	20.94	20.		0.69	20.26	19.83	19.4	18		(87)
` ′			!										<u> </u>			1	
· -	19.87	during he	19.87	19.88	19.89	1	9.9	19.9	19.		9.89	19.89	19.88	19.8	38		(88)
(00)///-				. 5.55		<u> </u>		I			2.00	. 0.00	1 .0.00	1			(· = /

Unit Section Factor for gains for rest of develling, PL, 2rr (see* Table 94) See* 0.89 0.89 0.89 1 1 1 (8)	Utilisation f	actor for a	ains for	rest of d	wellina. I	h2.m (se	ee Table	9a)						
(90)me		 	1	1		`	i	· ·	0.92	0.99	1	1		(89)
(90)me	Mean interr	nal temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 7	r 7 in Tabl	e 9c)				
Mean intermal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2			1	1		<u> </u>	i	i	1	 	18.35	17.85		(90)
18.11 18.27 18.6 19.07 19.53 19.9 20.03 20.01 19.76 19.17 18.57 18.09			•						f	LA = Livin	g area ÷ (4	1) =	0.15	(91)
18.11 18.27 18.6 19.07 19.53 19.9 20.03 20.01 19.76 19.17 18.57 18.09	Mean interr	nal temper	ature (fo	or the wh	ole dwel	lling) = fl	I A 🗴 T1	+ (1 – fl	A) x T2			L		_
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)me			`	1			i e	<u> </u>		19.17	18.57	18.09		(92)
17.96		tment to t	ı he mear	internal	tempera	ature fro	m Table	4e, whe	ere appro	L opriate				
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a [May Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm		_	1				i	ì	· · ·	·	18.42	17.94		(93)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	8. Space he	eating req	uirement											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec				•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)m= 1	F	1				Jun	Jul	Aua	Sep	Oct	Nov	Dec		
94 me		!	<u> </u>	<u> </u>	may	0 011			Сор		1101			
(95)m			1	1	0.94	0.82	0.62	0.68	0.91	0.98	1	1		(94)
Monthly average external temperature from Table 8 (96)m= 4.3	Useful gain	s, hmGm	, W = (94	4)m x (84	 4)m		l	l	l	l .				
(96) ms	(95)m= 517.4	9 569.93	616.42	658.68	662.77	565.1	409.01	420.54	520.71	518.48	495.56	493.52		(95)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m] (97)m (1850.77 1787.95 1611.43 1335.16 1021.45 676.72 430.67 453.89 726.91 1120.12 1512.69 1844.44 (97) (98)m (98)m (99)m (98)m (99)m (98)m (Monthly av	erage exte	ernal tem	perature	from Ta	able 8	•							
(97)me	(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 991.96 818.51 740.29 487.06 266.86 0 0 0 0 0 447.62 732.33 1005.08 Total per year (kWh/year) = Sum(98)satz = 5489.72 (98) Space heating requirement in kWh/m²/year 51.24 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 0 447.62 732.33 1005.08 (211) m = {[(98)m x (204)]} x 100 ÷ (206) Total (kWh/year) = Sum(211), s.satz 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Heat loss ra	ate for me	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
Space heating requirement in kWh/m²/year Stanting systems including micro-CHP	(97)m= 1850.	77 1787.95	1611.43	1335.16	1021.45	676.72	430.67	453.89	726.91	1120.12	1512.69	1844.44		(97)
Space heating requirement in kWh/m²/year S1.24 (99)	Space heat	ing requir	ement fo	r each m	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (41	1)m			
Space heating requirement in kWh/m²/year 51.24 (99) Space heating: Fraction of space heat from secondary/supplementary system C202) = 1 - (201) = 1 (202) Fraction of total heating from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) (211) (211) Space heating fuel (secondary), kWh/month Efficiency of secondary), kWh/month Space heating fuel (secondary), k	(98)m= 991.9	6 818.51	740.29	487.06	266.86	0	0	0	0	447.62	732.33	1005.08		_
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 89.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 447.62 732.33 1005.08 (211) m = {[(98)m x (204)] } x 100 ÷ (206) Total (kWh/year) = Sum(211) _{1.2,1012} 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	5489.72	(98)
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 89.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 0 447.62 732.33 1005.08 (211)m = {[(98)m x (204)] } x 100 ÷ (206) (211) Total (kWh/year) = Sum(211)_1.5.1012 = 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)	Space heat	ing requir	ement in	kWh/m²	/year								51.24	(99)
Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 0 447.62 732.33 1005.08 (211) m = {[(98)m x (204)]} x 100 ÷ (206) 1108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211), 4.1017 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	9a. Energy r	equiremer	nts – Ind	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					
Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 0 447.62 732.33 1005.08 (211)m = {[(98)m x (204)]} x 100 ÷ (206) 1108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211) Latorz 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	•	•										,		_
Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 447.62 732.33 1005.08 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 1108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211) ₁₅₁₀₁₂ 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)	Fraction of	space hea	at from s	econdary	y/supple	mentary	system						0	(201)
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 447.62 732.33 1005.08 (211)m = {[(98)m x (204)]} x 100 ÷ (206) [108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211) _{1,1012} 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Fraction of	space hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year	Fraction of	total heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year	Efficiency of	f main spa	ace heat	ing syste	em 1								89.5	(206)
Space heating requirement (calculated above) 991.96 818.51 740.29 487.06 266.86 0 0 0 0 447.62 732.33 1005.08 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 1108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211) _{15,1012} 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)	Efficiency of	f seconda	ry/suppl	ementar	y heating	g system	າ, %						0	(208)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Jar	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
$ (211) m = \{ [(98) m \ x \ (204)] \ \} \ x \ 100 \div (206) $ $ (211) m = \{ [(98) m \ x \ (204)] \ \} \ x \ 100 \div (206) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $	Space heat	ing requir	ement (c	alculate	d above)									
1108.34 914.53 827.14 544.21 298.17 0 0 0 0 500.13 818.25 1123 Total (kWh/year) = Sum(211) _{15,1012} 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	991.9	6 818.51	740.29	487.06	266.86	0	0	0	0	447.62	732.33	1005.08		
Total (kWh/year) = Sum(211) _{16,1012} = 6133.77 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	(211)m = {[(9	98)m x (20)4)] } x 1	00 ÷ (20	06)									(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	1108.3	914.53	827.14	544.21	298.17	0	0	0	0	500.13	818.25	1123		
$= \{[(98)m \times (201)]\} \times 100 \div (208)$								Tota	l (kWh/yea	ar) =Sum(2	211),,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	=	6133.77	(211)
	Space heat	ing fuel (s	econdar	y), kWh/	month							•		
(215)m + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 +	$= \{[(98) m x ($	201)] } x 1	00 ÷ (20	8)			1	•	•	•				
	(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
Total (kWh/year) = Sum(215) _{15,1012} = 0 (215)								Tota	I (kWh/yea	ar) = Sum(2)	215) _{15,1012}	=	0	(215)

Water heating								
Output from water heater (calculated above) 215.09 189.58 199.09 177.77 172.12 7	151.59 145.24	161.9	163.69	185.05	195.69	209.91		
Efficiency of water heater	 						89.5	(216)
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5 89.5	89.5	89.5	89.5	89.5	89.5		(217)
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$								
(219)m= 240.33 211.82 222.45 198.63 192.31	169.37 162.27	180.9	182.9	206.77	218.65	234.54		_
		Tota	I = Sum(2	19a) ₁₁₂ =			2420.93	(219)
Annual totals				k'	Wh/year	•	kWh/year	7
Space heating fuel used, main system 1							6133.77	_
Water heating fuel used							2420.93	
Electricity for pumps, fans and electric keep-hot								
mechanical ventilation - balanced, extract or pos	sitive input fror	m outside	e			247.21		(230a)
central heating pump:						30		(230c)
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			277.21	(231)
Electricity for lighting							420.97	(232)
12a. CO2 emissions – Individual heating system	ns including mi	icro-CHF)					
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x			0.2	16	=	1324.89	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	522.92	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1847.81	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	143.87	(267)
Electricity for lighting	(232) x			0.5	19	=	218.48	(268)
Total CO2, kg/year			sum o	of (265)(271) =		2210.17	(272)

 $(272) \div (4) =$

Dwelling CO2 Emission Rate

El rating (section 14)

20.63

(273)

(274)

			User D	etails:						
Assessor Name:	Chris Hocknell			Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 20	12		Softwa	are Vei	rsion:		Versio	n: 1.0.4.10	
		Pro	operty .	Address	: Flat 0-2	2-Lean				
Address:										
Overall dwelling dime	nsions:		Δrea	a(m²)		Av. Hei	iaht(m)		Volume(m³	١
Basement				<u> </u>	(1a) x		3.1	(2a) =	134.45	(3a)
Ground floor			6	6.91	(1b) x	2	2.6	(2b) =	173.97	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	le)+(1n)	1	10.28	(4)			J		
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:										
	main heating	secondary heating	,	other		total			m³ per hou	r
Number of chimneys	0 +	0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0	Ī = [0	x	20 =	0	(6b)
Number of intermittent far	 ns					0	x '	10 =	0	(7a)
Number of passive vents					Ī	0	x ′	10 =	0	(7b)
Number of flueless gas fir	res				Ī	0	X 4	40 =	0	(7c)
					_				_	_
1.60		(0 -) - (0b) - (7 -)) - (7 1-) - (7 ->	_				nanges per ho	_
Infiltration due to chimney If a pressurisation test has be					continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in th		aoa, p. 0000a	(, , , ,			o (o) to (. 5)		0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timbe	r frame or 0	0.35 fo	r masonr	y constr	uction			0	(11)
if both types of wall are producting areas of opening		esponding to t	he great	er wall are	a (after					
If suspended wooden fl		aled) or 0.1	(seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	er 0.05, else enter 0								0	(13)
Percentage of windows	and doors draught	stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)		, , ,	, ,		0	(16)
Air permeability value,	• • •		•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabili	•					:- h - :			0.15	(18)
Air permeability value applies Number of sides sheltere		as been done	or a deg	gree air pei	тпеаышу	is being us	sea		3	(19)
Shelter factor	u			(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorporati	ng shelter factor			(21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified for		ed							<u> </u>	 ` ′
Jan Feb	Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7								-	
(22)m- 5.1 5	40 44 42		2.0	2.7	1	4.2	1 -	4.7	1	

4.3

3.8

3.8

3.7

4.5

4.7

Wind Factor (22a)m = (22)m	÷ 4										
(22a)m= 1.27 1.25 1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (allo	ving for ob	oltor and s	wind on o		(21a) v	(22a)m					
Adjusted infiltration rate (allo	0.13		i -	eu) = _{0.11}	(21a) X	0.12	0.12	0.13	0.14		
Calculate effective air change			I		0.11	0.12	0.12	0.10	0.14		
If mechanical ventilation:										0.5	(23a)
If exhaust air heat pump using Ap	pendix N, (23	b) = (23a) ×	k Fmv (equa	ation (N	15)) , other	wise (23b) = (23a)			0.5	(23b)
If balanced with heat recovery: ef	ficiency in % a	allowing for i	in-use facto	or (from	Table 4h)	=				76.5	(23c)
a) If balanced mechanical				`			 			÷ 100]	
(24a)m= 0.27 0.26 0.26	0.25			0.23	0.23	0.23	0.24	0.25	0.25		(24a)
b) If balanced mechanical				- `	<u> </u>	, ,	 				(0.41.)
(24b)m = 0 0 0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house extract v if (22b)m < 0.5 x (23b)		•	-				5 v (22h	۸			
(24c)m =	0	$\frac{0}{0} = (230),$	0	0	0 = (220)	0	0	0	0		(24c)
d) If natural ventilation or v								Ů			(= 15)
if (22b)m = 1, then (24							0.5]				
(24d)m = 0 0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate -	enter (24a)	or (24b)	or (24c) o	or (24	d) in box	(25)					
(25)m= 0.27 0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
0.11(1											
3. Heat losses and heat loss	s parametei	r:									
3. Heat losses and heat loss ELEMENT Gross area (m²)	opening Opening m²	js N	Net Area A ,m²		U-valu W/m2		A X U (W/ł	〈)	k-value		A X k kJ/K
ELEMENT Gross	Opening	js N] × [<)			
ELEMENT Gross area (m²)	Opening	js N	A ,m²	╡ '	W/m2	K =	(W/ł	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Opening	js N	A ,m²	x1/	W/m2 1.2	K = 0.04] =	(W/k	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Opening	js N	A ,m ² 2.6 13.52	x1/	W/m2 1.2 [1/(1.2)+	K	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Opening	js N	A ,m ² 2.6 13.52 2.73	x1/ x1/ x1/	W/m2 1.2 (1/(1.2)+ (1/(1.2)+	$ \begin{array}{c} K \\ \hline 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Opening	js N	A ,m ² 2.6 13.52 2.73 4.16	x1/ x1/ x1/ x1/ x1/	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+	$ \begin{array}{c} K \\ \hline 0.04] = \\ 0.04$	3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Opening	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54	x1/ x1/ x1/ x1/ x1/	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+	$ \begin{array}{c} K \\ \hline 0.04] = \\ 0.04$	3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Opening	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51	x1/ x1/ x1/ x1/ x1/	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76 8.63 4.02	<)			(26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Opening	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37	x1/ x1/ x1/ x1/ x1/ x1/ x1/	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+	K	(W/h 3.12 15.48 3.13 4.76 8.63 4.02 4.7707	<)			(26) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Opening m²	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11	x1/ x1/ x1/ x1/ x1/ x1/ x1/ x1/	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.11	K	(W/h 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521				kJ/K (26) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81	Opening m²	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75	x1/ x1/ x1/ x1/ x1/ x1/ x1/ x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.11 0.15	K	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61	\$)			kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2	Opening m² 34.06	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2	x1/ x1/ x1/ x1/ x1/ x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48	\$)			(26) (27) (27) (27) (27) (27) (28) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07	34.06 0	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2 43.07	x1/ x1/ x1/ x1/ x1/ x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2 43.07 28.33	x1/ x1/ x1/ x1/ x1/ x x x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33 Walls Type5 56.95 Roof Type1 10.57	34.06 0 0	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2 43.07 28.33 56.95	x1/ x1/ x1/ x1/ x1/ x x x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				(26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33 Walls Type5 56.95 Roof Type1 10.57	34.06 0 0 0	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2 43.07 28.33 56.95 10.57 4.76	x1/ x1/ x1/ x1/ x1/ x x x x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				(26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (30) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33 Walls Type5 56.95 Roof Type1 10.57 Roof Type2 4.76	34.06 0 0 0	js N	A ,m ² 2.6 13.52 2.73 4.16 7.54 3.51 43.37 34.11 10.75 3.2 43.07 28.33 56.95 10.57	x1/ x1/ x1/ x1/ x1/ x x x x x x	W/m2 1.2 [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ [1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/F 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				(26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (30)

Party of	eilina					62.16					Г		-	(32b)
-	•	roof winde	ows, use e	effective wi	ndow U-va			formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		(02.5)
					ls and part					, -	-			
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	- TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•		ere the de tailed calci		constructi	ion are not	known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
					using Ap	nendix k	<					I	37.2	(36)
	•	,	,		= 0.15 x (3	•	•					l	51.2	(00)
	abric he			, ,	·				(33) +	(36) =			108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		
			=\								Sum(39) ₁ .	12 /12=	133.41	(39)
			HLP), W	r						= (39)m ÷				
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22	4.04	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	average =	Sum(40) ₁ .	12 / 12=	1.21	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								1						
4. Wa	iter heat	ing enei	gy requi	irement:								kWh/ye	ear:	
				irement:									ear:	(10)
Assum	ied occu	ıpancy, İ	N		(-0.0003	349 x (TF	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ıpancy, İ	N		(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.			ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	: [1 - exp ge in litre	es per da	ıy Vd,av	erage =	(25 x N)	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by		ay Vd,av	erage = designed t	(25 x N)	+ 36		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, I	ay Vd,avelwelling is	erage = designed ((25 x N) to achieve	+ 36 a water us	se target o	9) 10°	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the o	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2	par:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) 10 ² Nov	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usage hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all wash month 99.07	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	1.09 Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	Ined occurrence of A > 13.9 If A £ 13.9 If average the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of the annual of that 125 If average in the annual of the annual	ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy ipan	H + 1.76 x Atter usage hot water person per Mar day for ear 103.11 used - cal 148.83	ge in litre usage by a day (all was Apr ach month 99.07	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave lwelling is not and co. Jun ctor from T 90.98 190 x Vd,r 107.44	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46)	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Fotal = Su 134.73 Fotal = Su	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I ipancy, I	+ 1.76 x ater usage hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all wash month 99.07	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32	ge in litre usage by r day (all wash month 99.07 culated month 129.76 for use (no. 19.46	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave welling is not and co. Jun ctor from 7 90.98 190 x Vd,r 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56 enter 0 in 14.93	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage e volum	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 103.11 used - cal 148.83 ang at point 22.32 includir	ge in litre usage by a day (all we have ach month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated months generated genera	es per da 5% if the of the office of the off	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9	ppancy, I p, N = 1 p, N = 1 e hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32 includir and no tal	ge in litre usage by r day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,ave welling is not and co. Jun go.98 190 x Vd,r. 107.44 storage), 16.12 /WHRS nter 110	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by a day (all we have month 129.76 and 19.46 and and and and and and and and and and	es per da 5% if the of water use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46) (47)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Otherv Water a) If m	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ng any so ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fac 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) = 0 (50)$
b) If manufacturer's declared cylinder loss factor is not known	
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3	0 (51)
Volume factor from Table 2a	0 (52)
Temperature factor from Table 2b	0 (53)
Energy lost from water storage, kWh/year	$(47) \times (51) \times (52) \times (53) = 0 \tag{54}$
Enter (50) or (54) in (55)	0 (55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$
(56)m= 0 0 0 0 0 0	0 0 0 0 0 (56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m where (H11) is from Appendix H
(57)m= 0 0 0 0 0 0	0 0 0 0 0 (57)
Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss calculated for each month (59)m = (58) ÷	365 × (41)m
(modified by factor from Table H5 if there is solar water hea	· ·
(59)m= 0 0 0 0 0 0	0 0 0 0 0 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (4	H1)m
(61)m= 50.96 46.03 50.96 48.86 48.42 44.87 46.36	``
Total heat required for water heating calculated for each mon	
(62)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	
Solar DHW input calculated using Appendix G or Appendix H (negative quar	
(add additional lines if FGHRS and/or WWHRS applies, see A	
(63)m= 0 0 0 0 0 0 0 0	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Output from water heater	
(64)m= 215.87 190.26 199.79 178.61 172.93 152.3 145.9	2 162.67 164.46 185.69 196.38 210.66
(04)/112 210.07 100.20 100.70 170.01 172.00 102.0 140.0	Output from water heater (annual) ₁₁₂ 2175.54 (64)
Host gains from water heating kWh/month 0.25 ′ [0.95 × (45)	
Heat gains from water heating, kWh/month $0.25 \cdot [0.85 \times (45)]$ (65)m= 67.57 59.46 62.23 55.36 53.5 46.94 44.69	
	. ,
include (57)m in calculation of (65)m only if cylinder is in the	e dwelling or not water is from community neating
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec
(66)m= 140.82 140.82 140.82 140.82 140.82 140.82 140.82 140.8	2 140.82 140.82 140.82 140.82 140.82 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a)	also see Table 5
(67)m= 24.25 21.53 17.51 13.26 9.91 8.37 9.04	11.75 15.77 20.03 23.38 24.92 (67)
Appliances gains (calculated in Appendix L, equation L13 or I	_13a), also see Table 5
(68)m= 271.96 274.78 267.67 252.53 233.42 215.46 203.4	6 200.63 207.75 222.89 242 259.96 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15	ia), also see Table 5
(69)m= 37.08 37.08 37.08 37.08 37.08 37.08 37.08	3 37.08 37.08 37.08 37.08 37.08 (69)
Pumps and fans gains (Table 5a)	
(70)m= 3 3 3 3 3 3 3	3 3 3 3 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -112.66 -112.66 -112.66 -112.66 -112.66 -112.66 -112.6	6 -112.66 -112.66 -112.66 -112.66 (71)

Water heating	ı gains (T	able 5)												
(72)m= 90.82	88.49	83.64	76.89	71.91	6	5.19	60.07	67.3	33 70.35	77.33	85.04	88.5]	(72)
Total internal	l gains =			<u> </u>	_	(66)	m + (67)m	+ (68	3)m + (69)m + (70)m +	(71)m + (72)	m	_	
(73)m= 455.27	453.05	437.07	410.92	383.49	35	7.26	340.82	347	.96 362.12	388.5	418.66	441.62		(73)
6. Solar gain	s:													
Solar gains are	calculated	using sola	flux from	Table 6a	and	associ	ated equa	tions t	to convert to th	e applic	able orientat	ion.		
Orientation:		actor	Area			Flu			_ g		FF		Gains	
	Table 6d		m²			Tab	ole 6a		Table 6b		Table 6c		(W)	
Northeast _{0.9x}	0.54	X	13.	52	x	1	1.28	x	0.24	х	0.7	=	12.46	(75)
Northeast _{0.9x}	0.77	X	2.7	' 3	x	1	1.28	x	0.24	х	0.7	=	3.59	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x	1	1.28	x	0.24	X	0.7	=	5.46	(75)
Northeast _{0.9x}	0.54	X	13.	52	x	2	2.97	x	0.24	X	0.7	=	25.35	(75)
Northeast _{0.9x}	0.77	X	2.7	' 3	x	2	2.97	x	0.24	X	0.7	=	7.3	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x	2	2.97	x	0.24	X	0.7	=	11.12	(75)
Northeast _{0.9x}	0.54	X	13.	52	x	4	1.38	x	0.24	X	0.7	=	45.68	(75)
Northeast _{0.9x}	0.77	X	2.7	' 3	x	4	1.38	x	0.24	X	0.7	=	13.15	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x [4	1.38	x	0.24	x	0.7	=	20.04	(75)
Northeast _{0.9x}	0.54	X	13.	52	x	6	7.96	x	0.24	x	0.7	=	75.02	(75)
Northeast _{0.9x}	0.77	X	2.7	' 3	x	6	7.96	x	0.24	x	0.7	=	21.6	(75)
Northeast _{0.9x}	0.77	Х	4.1	16	x	6	7.96	х	0.24	x	0.7	=	32.91	(75)
Northeast _{0.9x}	0.54	Х	13.	52	x	9	1.35	х	0.24	x	0.7	=	100.84	(75)
Northeast _{0.9x}	0.77	X	2.7	' 3	x	9	1.35	x	0.24	x	0.7	=	29.03	(75)
Northeast _{0.9x}	0.77	Х	4.1	16	x	9	1.35	х	0.24	x	0.7	=	44.24	(75)
Northeast _{0.9x}	0.54	Х	13.	52	x	9	7.38	х	0.24	x	0.7	=	107.5	(75)
Northeast _{0.9x}	0.77	Х	2.7	' 3	x	9	7.38	x	0.24	x	0.7	=	30.95	(75)
Northeast _{0.9x}	0.77	Х	4.1	16	x	9	7.38	х	0.24	x	0.7	=	47.17	(75)
Northeast _{0.9x}	0.54	Х	13.	52	x	9	91.1	х	0.24	x	0.7	=	100.56	(75)
Northeast _{0.9x}	0.77	Х	2.7	' 3	x	9	91.1	х	0.24	x	0.7	=	28.96	(75)
Northeast _{0.9x}	0.77	Х	4.1	16	x	9	91.1	х	0.24	x	0.7	=	44.12	(75)
Northeast _{0.9x}	0.54	Х	13.	52	x	7	2.63	x	0.24	x	0.7	=	80.17	(75)
Northeast _{0.9x}	0.77	Х	2.7	' 3	x	7	2.63	х	0.24	x	0.7	=	23.08	(75)
Northeast _{0.9x}	0.77	X	4.1	6	x	7	2.63	х	0.24	x	0.7		35.17	(75)
Northeast _{0.9x}	0.54	X	13.	52	x [5	0.42	x	0.24	x	0.7		55.66	(75)
Northeast 0.9x	0.77	X	2.7	' 3	x [5	0.42	x	0.24	x	0.7		16.03	(75)
Northeast _{0.9x}	0.77	x	4.1	6	x	5	0.42	x	0.24	x	0.7	╗-	24.42	(75)
Northeast _{0.9x}	0.54	x	13.	52	x [2	8.07	x	0.24	x	0.7	=	30.98	(75)
Northeast _{0.9x}	0.77	x	2.7	73	x [2	8.07	x	0.24	x	0.7		8.92	(75)
Northeast _{0.9x}	0.77	х	4.1	6	x	2	8.07	x	0.24	x	0.7		13.59	(75)
Northeast _{0.9x}	0.54	х	13.	52	x	1	14.2	x	0.24	X	0.7	=	15.67	(75)
Northeast _{0.9x}	0.77	х	2.7	73	x [1	14.2	x	0.24	X	0.7	=	4.51	(75)
					-									

Northeast _{0.9x}	0.77	x	4.1	6	х		14.2	x	0.2	<u> </u>	x_[0.7		_	6.88	(75)
Northeast 0.9x	0.54	x	13.	52	х		9.21	X	0.2	24	_ x [0.7		=	10.17	(75)
Northeast _{0.9x}	0.77	x	2.7	'3	х		9.21	X	0.2	<u>2</u> 4	_ x [0.7		=	2.93	(75)
Northeast _{0.9x}	0.77	x	4.1	6	x	,	9.21	x	0.2	24	_ x [0.7		=	4.46	(75)
Southwest _{0.9x}	0.77	x	7.5	64	X	3	86.79	i	0.2	24	x	0.7		=	32.3	(79)
Southwest _{0.9x}	0.77	x	7.5	54	х	6	62.67	j	0.2	24	= x [0.7		=	55.02	(79)
Southwest _{0.9x}	0.77	x	7.5	54	X	8	35.75	ĺ	0.2	24	_ x [0.7		=	75.28	(79)
Southwest _{0.9x}	0.77	x	7.5	54	X	1	06.25	ĺ	0.2	24	T x	0.7		=	93.27	(79)
Southwest _{0.9x}	0.77	x	7.5	54	X	1	19.01	j	0.2	24	x	0.7		=	104.47	(79)
Southwest _{0.9x}	0.77	x	7.5	54	х	1	18.15	ĺ	0.2	24	X	0.7		=	103.72	(79)
Southwest _{0.9x}	0.77	x	7.5	54	х	1	13.91	ĺ	0.2	24	x	0.7		=	99.99	(79)
Southwest _{0.9x}	0.77	x	7.5	54	x	1	04.39	ĺ	0.2	24	×	0.7		=	91.64	(79)
Southwest _{0.9x}	0.77	x	7.5	54	x	ç	2.85	ĺ	0.2	24	= x	0.7		=	81.51	(79)
Southwest _{0.9x}	0.77	x	7.5	54	х	6	9.27	ĺ	0.2	24	x	0.7		=	60.81	(79)
Southwest _{0.9x}	0.77	X	7.5	54	x	4	14.07	ĺ	0.2	24	x	0.7		=	38.69	(79)
Southwest _{0.9x}	0.77	x	7.5	54	х	3	31.49	ĺ	0.2	24	= x [0.7		=	27.64	(79)
Northwest _{0.9x}	0.77	X	3.5	51	x	1	1.28	x	0.2	24	x	0.7		=	4.61	(81)
Northwest _{0.9x}	0.77	X	3.5	51	х	2	22.97	x	0.2	24	×	0.7		=	9.39	(81)
Northwest _{0.9x}	0.77	x	3.5	51	х	4	1.38	x	0.2	24	x	0.7		=	16.91	(81)
Northwest _{0.9x}	0.77	X	3.5	51	х	6	7.96	x	0.2	24	×	0.7		=	27.77	(81)
Northwest _{0.9x}	0.77	X	3.5	51	х	g	1.35	x	0.2	24	×	0.7		=	37.33	(81)
Northwest _{0.9x}	0.77	x	3.5	51	х	9	7.38	x	0.2	24	= x [0.7		=	39.8	(81)
Northwest _{0.9x}	0.77	x	3.5	51	X		91.1	х	0.2	24	x	0.7		=	37.23	(81)
Northwest _{0.9x}	0.77	X	3.5	51	x	7	72.63	x	0.2	24	x	0.7		=	29.68	(81)
Northwest _{0.9x}	0.77	x	3.5	51	x	5	50.42	x	0.2	24	= x	0.7		=	20.6	(81)
Northwest _{0.9x}	0.77	x	3.5	51	x	2	28.07	x	0.2	24	×	0.7		=	11.47	(81)
Northwest _{0.9x}	0.77	X	3.5	51	X		14.2	x	0.2	24	x	0.7		=	5.8	(81)
Northwest _{0.9x}	0.77	X	3.5	51	X		9.21	х	0.2	24	x	0.7		=	3.77	(81)
_								_								
Solar gains in					$\overline{}$			` 	n = Sum(7			1			1	
(83)m= 58.42	108.18	171.06	250.57	315.91		29.13	310.86	259	.75 19	8.22	125.77	71.55	48.9	7		(83)
Total gains – i			` ,		·				74 50	1	544.07	1 400 04	100			(0.4)
(84)m= 513.69	561.23	608.12	661.49	699.4	6	86.4	651.68	607	./1 56	0.34	514.27	490.21	490.	59		(84)
7. Mean inter			`													_
Temperature	_	٠.			•			ole 9	, Th1 (°	C)					21	(85)
Utilisation fac					Ť							 				
Jan	Feb	Mar	Apr	May	+	Jun	Jul	 		Sep	Oct	Nov	De	С		(0.0)
(86)m= 1	1	1	0.99	0.97		0.9	0.78	0.8	33 0	.96	0.99	1	1			(86)
Mean interna	l temper		iving are	ea T1 (f	ollo	w ste	ps 3 to 7	7 in T	able 9)		_			ı	
(87)m= 19.53	19.64	19.87	20.19	20.53	2	0.81	20.94	20.	91 20).68	20.26	19.85	19.5	1		(87)
Temperature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	able 9	9, Th2 (°C)						
(88)m= 19.9	19.9	19.9	19.91	19.91	1	9.92	19.92	19.	93 19	9.92	19.91	19.91	19.9)1		(88)

Unit Segret Seg	Utilisation	factor for o	ains for	rest of d	wellina. I	n2.m (se	e Table	9a)						
(90)me		 	1			,	1	<u> </u>	0.93	0.99	1	1		(89)
(90)me	Mean inte	nal temper	ature in	the rest	of dwelli	na T2 (f	ollow ste	eps 3 to 7	rin Tabl	e 9c)				
Mean intermal temperature (for the whole dwelling) = fLA x T1 + (1 - [LA) x T2			1			<u> </u>		•			18.4	17.91		(90)
18.15 18.31 18.62 19.09 19.55 19.92 20.04 20.03 19.76 19.19 18.6 18.14 18.14 18.24 20.04 20.03 19.76 19.19 18.6 18.14 18.24 20.03			•						f	LA = Livin	g area ÷ (4	1) =	0.14	(91)
18.15 18.31 18.62 19.09 19.55 19.92 20.04 20.03 19.76 19.19 18.6 18.14 18.14 18.24 20.04 20.03 19.76 19.19 18.6 18.14 18.24 20.03	Mean inte	nal temper	ature (fo	r the wh	ole dwel	lina) = fl	A × T1	+ (1 – fl	A) x T2			·		
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)me 18 18.16 18.47 18.94 19.4 19.77 19.89 19.88 19.61 19.04 18.45 17.99 (83) 3. Space heating requirement internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Unilisation factor for gains, hm: (94)me 1 1 1 0.99 0.98 0.94 0.83 0.63 0.69 0.92 0.99 1 1 1 Useful gains, hmGm, W = (94)m x (84)m (95)me 512.88 559.72 604.57 650.18 660.21 567.09 411.82 422.31 514.52 507.83 489.77 489.99 (95)me 512.88 559.72 604.57 650.18 660.21 567.09 411.82 422.31 514.52 507.83 489.77 489.99 (95)me 1857.69 17.93 7 1616.13 1339.71 1025.43 680.43 433.76 166.9 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, W = (39)m x (93)m - (96)m 1 (97)me 1857.69 1793.7 1616.13 1339.71 1025.43 680.43 433.76 166.92 729.58 1123.95 1518.94 1852.43 (97) Space heating requirement for each month, kWh/month = 0.024 x (197)m - (95)m 1 x (41)m (98)me 1000.54 829.23 752.6 486.46 271.72 0 0 0 0 0 468.39 741.72 1013.66 (98) Space heating requirements — Individual heating systems including micro-CHP Space heating requirements — Individual heating systems including micro-CHP Space heating requirement (accurated above) Efficiency of main space heat from main system 1 (204) = (202) x (1 - (203)) = 1 (204) (204			- `				r			19.19	18.6	18.14		(92)
(93)mt 18		stment to t	he mear	ı ı internal	tempera	ature fro	m Table	4e, whe	re appro	ppriate				
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a [May Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm	· · · · - - · ·		1							·	18.45	17.99		(93)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	8. Space h	eating req	uirement											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec				•		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)m= 1						Jun	Jul	Aua	Sep	Oct	Nov	Dec		
1			<u> </u>	<u> </u>	···ay	- Cuii		7149	СОР		1101			
(95)me 512.88 559.72 604.57 650.18 660.21 567.09 411.82 422.31 514.52 507.83 488.77 489.98 (95) Monthly average external temperature from Table 8 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean intermal temperature, Lm , W = (39)m × (93)m × (96)m (97)m= 1857.69 1793.7 1616.13 1339.71 1025.43 880.43 433.76 456.92 729.58 1123.95 1518.94 1852.43 (97) Space heating requirement for each month, kWh/month = 0.024 × [(97)m - (95)m] × (41)m (98)m= 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 458.39 741.72 1013.66 (99) 9a. Energy requirements — Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heating from main system (\$1 (204) = (202) × [1 - (203)] = 1 (204) = (202) × [1 - (203)] = 1 (204) = (20		 	1		0.94	0.83	0.63	0.69	0.92	0.99	1	1		(94)
Monthly average external temperature from Table 8 (96)m= 4.3	Useful gai	ns, hmGm	, W = (9	4)m x (84	4)m		I.							
(96) ms	(95)m= 512.	88 559.72	604.57	650.18	660.21	567.09	411.82	422.31	514.52	507.83	488.77	489.98		(95)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m] (97)m=	Monthly av	erage exte	ernal tem	perature	from Ta	able 8								
(97)me	(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 0 458.39 741.72 1013.66 Total per year (kWh/year) = Sum(98). ss. v = 5564.34 (98) Space heating requirement in kWh/m²/year 50.46 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system 1 (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) x [1 - (203)] = 0 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)]} x 100 ÷ (206) Total (kWh/year) = Sum(211), s.suz 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Heat loss	ate for me	an intern	al tempe	erature, l	_m , W =	=[(39)m :	x [(93)m	– (96)m]				
Space heating requirement in kWh/m²/year Soundary/supplementary system	(97)m= 1857	.69 1793.7	1616.13	1339.71	1025.43	680.43	433.76	456.92	729.58	1123.95	1518.94	1852.43		(97)
Space heating requirement in kWh/m²/year 5564.34 (98)		-i	ement fo			Vh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4 ⁻	1)m	·		
Space heating requirement in kWh/m²/year 50.46 (99) Space heating: Fraction of space heat from secondary/supplementary system C202) = 1 - (201) = 1 (202) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) (211) (200) (200	(98)m= 1000	.54 829.23	752.6	496.46	271.72	0	0	0	0	458.39	741.72	1013.66		_
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 89.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)] } x 100 ÷ (206) Total (kWh/year) = Sum(211) _{1.2.1012} 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	5564.34	(98)
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 89.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jul Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 458.39 741.72 1013.66 (211) (211)m = {[(98)m x (204)]} x 100 ÷ (206) Total (kWh/year) = Sum(211)_1.5.1012 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Space hea	iting require	ement in	kWh/m²	/year								50.46	(99)
Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 458.39 741.72 1013.66 (211) m = {[(98)m x (204)]} x 100 ÷ (206) 11117.93 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211), 4.1017 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	9a. Energy	requiremer	nts – Ind	ividual h	eating sy	/stems i	ncluding	micro-C	HP)					
Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 1117.93 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211) Latorz 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	•	•										,		_
Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) [1000.54] 829.23 752.6 496.46 271.72 0 0 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)]} x 100 ÷ (206) [1117.93] 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211) ₁₅₁₀₁₂ 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Fraction of	space hea	at from s	econdar	y/supple	mentary	system						0	(201)
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)]} x 100 ÷ (206) 11117.93 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211) _{15,1012} 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	Fraction of	space hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year	Fraction of	total heati	ng from	main sys	stem 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year	Efficiency	of main spa	ace heat	ing syste	em 1								89.5	(206)
Space heating requirement (calculated above) 1000.54 829.23 752.6 496.46 271.72 0 0 0 0 458.39 741.72 1013.66 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 1117.93 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211) _{15,1012} 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)	Efficiency	of seconda	ry/suppl	ementar	y heating	g system	າ, %						0	(208)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ja	n Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
$ (211) m = \{ [(98) m \ x \ (204)] \ \} \ x \ 100 \div (206) $ $ (211) m = \{ [(98) m \ x \ (204)] \ \} \ x \ 100 \div (206) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $ $ (211) m = \{ [(98) m \ x \ (201)] \ \} \ x \ 100 \div (208) $	Space hea	ting require	ement (c	alculate	d above)									
1117.93 926.51 840.9 554.7 303.6 0 0 0 0 512.17 828.74 1132.58 Total (kWh/year) = Sum(211) _{15,1012} 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	1000	.54 829.23	752.6	496.46	271.72	0	0	0	0	458.39	741.72	1013.66		
Total (kWh/year) = Sum(211) _{15,1012} = 6217.14 (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	$(211)m = {[}$	(98)m x (20)4)] } x 1	00 ÷ (20	6)		_							(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)]} x 100 ÷ (208)	1117	.93 926.51	840.9	554.7	303.6	0	0							_
$= \{[(98)m \times (201)]\} \times 100 \div (208)$								Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	6217.14	(211)
	Space hea	iting fuel (s	econdar	y), kWh/	month							•		_
(215)m $=1$ 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0		(201)] } x 1	00 ÷ (20	8)										
	(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
Total (kWh/year) = Sum(215) _{15,1012} 0 (215)								Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}		0	(215)

Water heating								
Output from water heater (calculated above) 215.87	152.3 145.92	162.67	164.46	185.69	196.38	210.66		
Efficiency of water heater							89.5	(216)
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5 89.5	89.5	89.5	89.5	89.5	89.5		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m		·						
(219)m= 241.19 212.58 223.23 199.57 193.22	170.17 163.04		183.76	207.47	219.42	235.38		_
		Tota	al = Sum(2				2430.77	(219)
Annual totals				k	Wh/yea	r	kWh/year	٦
Space heating fuel used, main system 1							6217.14	_
Water heating fuel used							2430.77	
Electricity for pumps, fans and electric keep-h	ot							
mechanical ventilation - balanced, extract or	positive input fro	om outside	е			253.98		(230a)
central heating pump:						30		(230c)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =			283.98	(231)
Electricity for lighting							428.18	(232)
12a. CO2 emissions – Individual heating sys	tems including r	nicro-CHF)					
	Energy kWh/yea	r		Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x			0.2	16	=	1342.9	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	525.05	(264)
Space and water heating	(261) + (262	2) + (263) + ((264) =				1867.95	(265)
Electricity for pumps, fans and electric keep-h	ot (231) x			0.5	19	=	147.38	(267)
Electricity for lighting	(232) x			0.5	19	=	222.22	(268)
Total CO2, kg/year			sum o	of (265)(271) =		2237.56	(272)

 $(272) \div (4) =$

Dwelling CO2 Emission Rate

El rating (section 14)

20.29

(273)

(274)

		l Isar I	Details:						
Assessor Name:	Chris Hocknell	- 036 1-1	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	Flat 1-	1-Lean				
Address: 1. Overall dwelling dime	anciona:								
1. Overall dwelling diffie	ensions.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	r
Number of chimneys		T + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0		0	Ī - Ē	0	x2	20 =	0	(6b)
Number of intermittent fa	ins			, L	0	x '	10 =	0	(7a)
Number of passive vents	;			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ē	0	X 4	40 =	0	(7c)
				_				_	
		_	- \	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(peen carried out or is intended, proceed			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		.a to (),			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wall are	a (aitei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	·							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = (16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
<u> </u>	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
	• •	_			_			-	

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effe		•	rate for t	he appli	cable ca	ise	-	-	-	-	-		(220)
If exhaust air h			endix N (2	(23a) = (23a	a) x Fmv (equation (1	N5)) othe	rwise (23h) = (23a)			0.5	(23a)
If balanced with) = (20u)			0.5	(23b)
a) If balance		-	-	_					2h\m + (23h) ~ [1 _ (23c)	76.5	(23c)
(24a)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(24a)
b) If balance	ļ		<u> </u>	ļ	Į	<u> </u>	<u> </u>	<u>l</u>	ļ	<u> </u>	1	J	, , ,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole h	nouse ex n < 0.5 >			•					.5 × (23b))	1	ı	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural	ventilation ventilation			•					0.5]	ı	1	ı	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24d)
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	· (25)	!		•	•	
(25)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losse	s and he	eat loss i	naramet	er.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,ı		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-		X X k J/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1.	/[1/(1.2)+	0.04] =	6.31	$\overline{}$			(27)
Windows Type	e 4				0.65	x1.	/[1/(1.2)+	0.04] =	0.74	\equiv			(27)
Floor					14.69) x	0.11	=	1.6159				(28)
Walls Type1	67.7	78	20.5	8	47.2	X	0.15	=	7.08				(29)
Walls Type2	24.4	17	2.6		21.87	7 X	0.15	=	3.28				(29)
Walls Type3	5.9	3	0		5.93	X	0.15	-	0.89	T i		ī	(29)
Total area of e	elements	s, m²			112.8	7							(31)
Party wall					12.38	3 x	0		0	\neg			(32)
Party floor					59.37	7						-	(32a)
Party ceiling					74.06	<u> </u>						-	(32b)
* for windows and ** include the are						lated using	ı formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	n paragraph	1 3.2	
Fabric heat los	ss, W/K	= S (A x	U)				(26)(30	+ (32) =				39.55	(33)
Heat capacity	Cm = S	(A x k)						((28).	(30) + (32	2) + (32a)	(32e) =	27754.95	(34)
Thermal mass	parame	eter (TMI	= Cm +	: TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design asses				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix	K						18.19	(36)

if details of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total fabric he								(33) +	(36) =			57.74	(37)
Ventilation hea	at loss ca	alculated	l monthly	У				(38)m	= 0.33 × (25)m x (5)		İ	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m= 75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		
		II D) \ \	/ 014						_	Sum(39) ₁	12 /12=	74.07	(39)
Heat loss para	- `	- 			0.00	0.00	0.00	` ′	= (39)m ÷	`	4.04	[
(40)m= 1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01	4	(40)
Number of day	ys in moi	nth (Tab	le 1a)						average =	Sum(40) ₁ .	12 / 1 Z=	. 1	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
A sourced oos	inanai.	N I										1	(40)
Assumed occu if TFA > 13.			[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)1 + 0.0	0013 x (ΓFA -13.		34		(42)
if TFA £ 13.				(- (, ,,	(- /			
Annual averag									o toract o		.79		(43)
Reduce the annuance not more that 125	_				_	_	o acnieve	a water us	se target o	T			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	L		<u> </u>					Seb	Oct	INOV	Dec		
(44)m= 98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
(11)				•			•			m(44) ₁₁₂ =	l	1077.45	(44)
Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D)Tm / 3600						
(45)m= 146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
									Γotal = Su	m(45) ₁₁₂ =		1412.71	(45)
If instantaneous v	vater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)		ı	ı	ı	
(46)m= 21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water storage Storage volum) includir	na anv sa	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	` ′		•			•		XIIIO VOO	301		0		(47)
Otherwise if no	_			•			` '	ers) ente	er '0' in (47)			
Water storage			`					,	`	,			
a) If manufact	turer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =			0		(50)
b) If manufact			-									· !	
Hot water stor If community h	-			ie∠(KVVI	n/litre/da	ay)					0		(51)
Volume factor	_		UII 4.3								0		(52)
Temperature f			2b								0		(53)
Energy lost fro				ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or		_	, , ,				. , ()	. , (,	-	0		(55)
. ,	•											ı	•

Water stor	age loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder cor	ntains dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary cir	cuit loss (ar	nual) fro	m Table	3							0		(58)
Primary cir	rcuit loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modifie	d by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss	s calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50	.33 43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat	required for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW ir	nput calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additi	onal lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	m water hea	ter											
(64)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	•	•			•		Outp	out from w	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains	from water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 61	.28 53.55	55.62	49.17	47.52	41.69	39.7	44.40			T			(CE)
		l		77.02	41.09	39.7	44.49	44.99	51.46	55.17	59.75		(65)
include ((57)m in cal		ļ.		<u> </u>	<u> </u>	ļ			ļ	ļ	eating	(65)
	(57)m in cal	culation (of (65)m	only if c	<u> </u>	<u> </u>	ļ			ļ	ļ	eating	(65)
5. Interna	al gains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	ļ			ļ	ļ	eating	(65)
5. Interna	. ,	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	ļ			ļ	ļ	eating	(65)
5. International Metabolic	al gains (see	culation of Table 5	of (65)m and 5a ts	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. International Metabolic (66)m= 117	gains (Table an Feb 7.03 117.03	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. International Metabolic (66)m= 117 Lighting ga	gains (see gains (Table an Feb	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. Internal Metabolic (66)m= 117 Lighting ga (67)m= 18	gains (Table gains (Table an Feb 7.03 117.03 ains (calcula	Table 5 2 Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3	of (65)m 6 and 5a ts Apr 117.03 opendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
Metabolic Jacob Metabolic Jacob Metabolic Meta	gains (see gains (Table an Feb 7.03 117.03 ains (calcula	Table 5 2 Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3	of (65)m 6 and 5a ts Apr 117.03 opendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
Metabolic Jacob Metabolic	gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
Metabolic Jacob Metabolic	gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 a gains (calcula 6.58 208.73 ains (calcula	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34	gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 a gains (calcula 6.58 208.73 ains (calcula	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic James (66)m= 117 Lighting gas (67)m= 18 Appliances (68)m= 206 Cooking gas (69)m= 34 Pumps and	gains (See gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula s.58 208.73 ains (calcula 1.7 34.7	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 3	gains (See gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 as gains (calcula .5.58 208.73 ains (calcula 1.7 34.7 d fans gains	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions: May 117.03 L, equation 7.53 dix L, equation 177.31 L, equation 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g	gains (See gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula 5.58 208.73 ains (calcula 1.7 34.7 d fans gains	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions: May 117.03 L, equation 7.53 dix L, equation 177.31 L, equation 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal Metabolic ((66)m=	gains (See gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula .5.58 208.73 ains (calcula 1.7 34.7 d fans gains 3 3	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negar	of (65)m s and 5a ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 3 Losses e.g (71)m= -93 Water hea	gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 s gains (calcula 1.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62	culation of Table 5 2 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negar	of (65)m s and 5a ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g (71)m= -93 Water hea (72)m= 82	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 as gains (calcula 5.58 208.73 ains (calcula 5.7 34.7 d fans gains 3 3 g. evaporatio 5.62 -93.62 ting gains (7	culation of the culation of th	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)
5. Internal Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 3 Losses e.g (71)m= -93 Water hea (72)m= 82 Total inter	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 a gains (calcula 5.58 208.73 ains (calcula 1.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62 ting gains (79.68	culation of the culation of th	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	х	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	х	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	X	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	X	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67		0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	X	62.67		0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	X	85.75		0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	X	85.75		0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	X	106.25		0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25		0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15		0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	X	104.39		0.24	X	0.7	=	66.97	(79)

Southwest _{0.9}	<u> </u>	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwest _{0.9}	× 0.77	X	0.6	S5	X	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	X	6	9.27			0.24	X	0.7	=	44.43	(79)
Southwest _{0.9}	x 0.77	X	0.6	35	X	6	9.27			0.24	X	0.7	=	5.24	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	X	4	4.07]		0.24	X	0.7	=	28.27	(79)
Southwest _{0.9}	× 0.77	X	0.6	S5	X	4	4.07]		0.24	X	0.7	=	3.34	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	x	3	1.49]		0.24	x	0.7	=	20.2	(79)
Southwest _{0.9}	× 0.77	X	0.6	S5	x	3	1.49			0.24	x	0.7	=	2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m		-	_	
(83)m= 45.3	3 83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains -	- internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts							_	
(84)m= 413.8	449.38	483.46	521.58	548.52	53	37.26	510.51	479	.03	444.62	411.58	394.75	395.86		(84)
7. Mean int	ernal tem	perature	(heating	season)										
Temperatu	re during l	neating p	eriods ir	n the livi	ng a	area 1	from Tal	ole 9,	, Th	1 (°C)				21	(85)
Utilisation f	actor for g	ains for	living are	ea, h1,m	(Se	ee Ta	ble 9a)								
Jar	n Feb	Mar	Apr	May	Ì,	Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.98	0.93	().78	0.61	0.6	67	0.9	0.99	1	1		(86)
Mean inter	nal tempe	rature in	living an	ea T1 (fo	טווס	w ste	ns 3 to 7	7 in T	able	3 9c)		•	•		
(87)m= 19.9		20.21	20.5	20.77	_	0.94	20.99	20.		20.86	20.53	20.17	19.88		(87)
` '		l		<u> </u>			l	I		2 (90)			<u> </u>		
Temperatu (88)m= 20.0	-	20.07	20.08	20.08	_	eiiing 20.1	20.1	20.	$\overline{}$	20.09	20.08	20.08	20.08	7	(88)
` '		I	l	L			l	<u> </u>		20.00	20.00	20.00	20.00		(00)
Utilisation f		1	i	· · ·			·	–				 			(00)
(89)m= 1	1	0.99	0.97	0.9		0.7	0.49	0.5	5	0.85	0.98	1	1		(89)
Mean inter	nal tempe	rature in	the rest	of dwell	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)			_	
(90)m= 18.5	9 18.75	19.04	19.47	19.84	2	0.05	20.09	20.	09	19.97	19.52	18.99	18.57		(90)
										f	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inter	nal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 18.9	3 19.08	19.35	19.74	20.08	2	0.29	20.33	20.	32	20.2	19.78	19.3	18.91		(92)
Apply adjus	stment to t	he mear	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate			_	
(93)m= 18.7	8 18.93	19.2	19.59	19.93	2	0.14	20.18	20.	17	20.05	19.63	19.15	18.76		(93)
8. Space h	eating req	uirement													
Set Ti to th			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	:(76)m an	d re-ca	lculate	
the utilisation				1		1	11	Ι		0	0-4	l Na		7	
Jar Utilisation f		Mar Jaine hm	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(94)m= 1	0.99	0.99	0.97	0.89	_).71	0.51	0.5	56 T	0.84	0.97	0.99	1		(94)
Useful gair		<u> </u>	<u> </u>		`	·	0.01			0.01	0.07	1 0.00			(- /
(95)m= 412.6	1	477.96	503.47	488.04	38	30.59	257.97	269	9.4	374.49	400.82	392.51	394.97		(95)
Monthly av		l .	<u> </u>	l	<u> </u>		I						<u> </u>		•
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss r	ate for me	an intern	al temp	erature,	Lm	, W =	=[(39)m	x [(93	 3)m-	 - (96)m]	-		_	
	81 1056.68	1	792.13	608.54	_	03.63	260.77	274	_ _	436.47	667.5	895.45	1088.16	6	(97)
	-				_									_	

Space heating	T	1			I	T	T)m – (95		r e			
(98)m= 506.8	409.62	354.19	207.83	89.65	0	0	0	0	198.41	362.11	515.73	2044.25	7(00)
							Lota	l per year	(kWh/yeai	r) = Sum(9	8)15,912 =	2644.35	(98)
Space heatir	ng require	ement in	kWh/m²	² /year								35.71	(99)
8c. Space co	Ĭ												
Calculated for Jan	or June, . Feb	July and Mar		See Tal May		Jul	L	Sep	Oct	Nov	Dec		
Heat loss rat		<u> </u>	Apr		Jun nal temi		Aug and exte						
100)m= 0	0	0	0	0	685.27	539.47	552.51	0	0	0	0		(100
Utilisation fac	ctor for lo	oss hm			<u>I</u>	<u>!</u>	!		<u>I</u>	Į	<u> </u>		
101)m= 0	0	0	0	0	0.86	0.93	0.9	0	0	0	0		(101
Useful loss, I	hmLm (V	Vatts) = ((100)m x	(101)m									
102)m= 0	0	0	0	0	591.68	500.37	499.94	0	0	0	0		(102
Gains (solar	1								ı				
103)m= 0	0	0	0	0	706.39	673.64	637.8	0	0	0	0	(44)	(103
Space cooling set (104)m to	•				lwelling,	continu	ous (kW	(h) = 0.0	24 x [(10)3)m – (102)m J	x (41)m	
104)m= 0	0	0	0	0	82.6	128.91	102.56	0	0	0	0		
	!	!			Į	!	!	Total	= Sum(104)	=	314.07	(104
Cooled fractio								f C =	cooled	area ÷ (4	4) =	0.6	(105
ntermittency t	- `	1				ı	1					1	_
106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		٦
Space cooling	ı require	ment for	month -	(104)m	~ (105)	v (106);	m	I ota	I = Sum(104)	=	0	(106
107)m= 0	0	0	0	0	12.41	19.36	15.41	0	0	0	0		
	!				<u> </u>	<u> </u>	<u> </u>	Total	= Sum(107)	=	47.18	(107
Space cooling	requirer	ment in k	:Wh/m²/y	/ear				(107)) ÷ (4) =		ļ	0.64	(108
a. Energy re	quiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heati						_		·					
Fraction of sp	pace hea	at from s	econdar	y/supple	mentary	system						0	(201
Fraction of s	pace hea	at from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202
Fraction of to	otal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204
Efficiency of	main spa	ace heat	ing syste	em 1							Ī	89.5	(206
Efficiency of	seconda	ry/suppl	ementar	y heating	g systen	า, %					į	0	(208
Cooling Syst	em Ener	gy Efficie	ency Ra	tio								4.73	(209
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ ear
Space heating		l	· ·				1 1119					,, J	
506.8	409.62	354.19	207.83	89.65	0	0	0	0	198.41	362.11	515.73		
211)m = {[(98	3)m x (20)4)] } x 1	00 ÷ (20	06)		-	-			-			(211
566.26	457.67	395.74	232.22	100.17	0	0	0	0	221.68	404.59	576.24		
	-	-			-	-	Tota	l (kWh/yea	ar) =Sum(2	211),15,1012	 ₂ =	2954.58	(211
Space heating	ng fuel (s	econdar	y), kWh/	month							'		_
= {[(98 <u>)</u> m x (2	01)] } x 1	00 ÷ (20											
215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	I (kWh/yea	ar) = Sum(2)	215) _{15,1012}	<u>_</u>	0	(215

Water heating								
Output from water heater (calculated above) 196.8 171.91 178.86 158.64 153.59 1	35.27 129.6	144.48	146.07	166.33	177.56	192.18		
Efficiency of water heater	33.27 129.0	144.40	140.07	100.55	177.50	192.10	89.5	(216)
·	89.5 89.5	89.5	89.5	89.5	89.5	89.5		」、 / (217)
Fuel for water heating, kWh/month							l	
(219) m = (64) m x $100 \div (217)$ m (219)m = 219.89 192.08 199.84 177.25 171.61 1	51.14 144.81	161.43	163.21	185.85	198.39	214.72		
210.00 102.00 100.04 177.20 171.01 1	01.14			19a) ₁₁₂ =	100.00	214.72	2180.21	(219)
Space cooling fuel, kWh/month.						ļ		J` ′
(221)m = (107)m÷ (209)								
(221)m= 0 0 0 0 0	2.63 4.1	3.26	0 = Sum(22	0 =	0	0	9.98	(221)
Annual totals		10101	- Gam(Zi		Mhhraai	_		
Space heating fuel used, main system 1				K	Wh/yeaı		kWh/year 2954.58	7
Water heating fuel used							2180.21	ĺ
Space cooling fuel used							9.98	์ โ
Electricity for pumps, fans and electric keep-hot								_
mechanical ventilation - balanced, extract or pos	sitive input from	m outside)			158.57		(230a)
central heating pump:						30		(230c)
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			188.57	(231)
Electricity for lighting							325.25	(232)
12a. CO2 emissions – Individual heating system	s including m	icro-CHP						
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	638.19	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	470.92	(264)
Space and water heating								_
•	(261) + (262)	+ (263) + (2	264) =				1109.11	(265)
Space cooling	(261) + (262) (221) x	+ (263) + (2	264) =	0.5	19	=	1109.11 5.18	(265)
Space cooling Electricity for pumps, fans and electric keep-hot	, , , ,	+ (263) + (2	264) =	0.5		= =		_
,	(221) x	+ (263) + (2	264) =		19		5.18	(266)
Electricity for pumps, fans and electric keep-hot	(221) x (231) x	+ (263) + (2	·	0.5	19	=	5.18 97.87	(266)
Electricity for pumps, fans and electric keep-hot Electricity for lighting	(221) x (231) x	+ (263) + (2	sum o	0.5	19	=	5.18 97.87 168.8	(266) (267) (268)

		l Isar I	Details:						
Assessor Name:	Chris Hocknell	— 	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	Flat 1-2	2-Lean				
Address: 1. Overall dwelling dime	ansions:								
1. Overall dwelling diffie	: IISIOIIS.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) = -	76.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	T + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = [0	x	20 =	0	(6b)
Number of intermittent fa	ns				0	x -	10 =	0	(7a)
Number of passive vents	;			Ē	0	x -	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	x	40 =	0	(7c)
				_					
		_	- \	_				nanges per ho	_
	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)$ seen carried out or is intended, process			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		.a to (),			o (o) to	(1.0)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi	-	o irie grea	ter wall are	a (aitei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	(8), otherw	vise (18) = (16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ea each		(20) = 1 -	[0.0 75 x (1	19)] =			0.78	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
- 		-	-		-	•	-	•	

Adjusted infiltra	alion rate (allow	ving for sl	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
	ctive air change	rate for t	he appli	cable ca	se	•	•	•	•			— ,
	al ventilation: eat pump using App	nondiy N (C	93h) — (93a	a) Em. /c	auation (VEVV otho	nuico (22h) - (220)			0.5	(23a)
	n heat recovery: effi) = (23a)			0.5	(23b)
	-	-	_					2h\ (00h) [(22°)	76.5	(23c)
a) if balance (24a)m= 0.27	ed mechanical v	0.25	0.24	at recove	0.23	0.23	0.23	2b)m + (. 0.24	23D) x [¹ 0.25	0.25	÷ 100]	(24a)
` ′	ļļ_		<u> </u>				<u> </u>	<u> </u>	<u> </u>	0.23		(244)
	ed mechanical v				overy (r		$\int_{0}^{\infty} \int_{0}^{\infty} dx = (22)$	 				(24b)
` ′	0 0	0	0	0		0		0	0	0		(240)
,	ouse extract vent $< 0.5 \times (23b)$,		•	•				.5 × (23b))			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
,	ventilation or w			•				0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a) or (24b	o) or (240	c) or (24	d) in box	· (25)				l	
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
2 Hastlesse	s and heat loss	10 0 10 0 0 th										
ELEMENT	Gross area (m²)	Openin m	ıgs	Net Ar A ,r		U-valı W/m2		A X U (W/I	≺)	k-value kJ/m²-ł		X k J/K
Doors				2.6	х	1.2	_ = [3.12				(26)
Windows Type) 1			3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	2			3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	3											
Windows Type				5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(27)
Floor	: 4			5.51 0.65	=	/[1/(1.2)+ /[1/(1.2)+	l l	6.31				(27) (27)
LIOOI	4			0.65	x1	/[1/(1.2)+	l.	0.74			-	(27)
		20.5	8	0.65	x1	/[1/(1.2)+ 0.11	0.04] =	0.74				(27)
Walls Type1	38.14	20.5		0.65 14.36 17.56	x1 x	/[1/(1.2)+ 0.11 0.15	0.04] = [0.74 1.5796 2.63				(27) (28) (29)
Walls Type1 Walls Type2	38.14	2.6		0.65 14.36 17.56 21.32	x1 x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29)
Walls Type1 Walls Type2 Walls Type3	38.14 23.92 5.95	2.6		0.65 14.36 17.56 21.32 5.95	x1 x2 x2 x4 x4 x4 x4 x4 x4 x4	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (29) (31)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area	38.14 23.92 5.95 29.51 elements, m²	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (31) (32) (32a (32b)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0	as given in		39.42	(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A x k)	2.6 0 0 effective wiinternal wall	indow U-ve	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx xx xx xx x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	effective with internal wall x U)	indow U-va lls and par	0.65 14.36 17.56 21.32 5.95 29.51 111.8i 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx ated using	0.11 0.15 0.15 0.15 0.15 0.15 0.16 0.17 0.17	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0 (a) (a) (b) (a) (a) (b) (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c		(32e) =	39.42	(27) (28) (29) (29) (29) (31) (32) (32a)

can be u	ısed instea	ad of a de	tailed calc	ulation.										
					using Ap	pendix I	K						18.24	(36)
	Ū	`	,		= 0.15 x (3	•								(3.37
Total fa	abric hea	at loss							(33) +	(36) =			57.66	(37)
Ventila	tion hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m		_	
(39)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24		
Heat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	73.62	(39)
(40)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		
Numbe	er of day	s in moi	nth (Tab	le 1a)					•	Average =	Sum(40) ₁	12 /12=	0.97	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31]	(41)
4. Wa	ter heat	ing ener	rgy requi	rement:								kWh/y	ear:	
if TF.	ed occu A > 13.9 A £ 13.9	0, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		.38]	(42)
Annual Reduce	averag	e hot wa Il average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target c).82]	(43)
I	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Hot wate					Vd,m = fa						1			
(44)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	1	
l	<u> </u>		ļ		Į	Į	<u>!</u>	<u>l</u>		Total = Su	m(44) ₁₁₂ =	<u></u>	1089.8	(44)
Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	(c, 1d)		
(45)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
If instant	tanaaya w	atar haati	na ot noint	of upo (no	hot woto	r otorogol	ontor O in	hoves (46		Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
ı								boxes (46					1	(40)
(46)m= Water	22.22 storage	19.44 loss:	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52]	(46)
	_		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
If comr	nunity h	eating a	nd no ta	nk in dw	elling, e	nter 110) litres in	(47)					J	
	•	-			_			ombi boil	ers) ente	er '0' in ((47)			
	storage												-	
,					or is kno	wn (kWł	n/day):					0	_	(48)
•			m Table									0	Ţ	(49)
			storage	-	ear loss fact	or is not	known:	(48) x (49)) =			0	J	(50)
Hot wa	ter stora	age loss		om Tabl	le 2 (kW							0]	(51)
	e factor	-		1.0								0	1	(52)
			m Table	2b								0	<u> </u>	(53)
													_	

Energy lost fro		-	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (. , .	,									0		(55)
Water storage	loss cal	culated f	or each	month		,	((56)m = ((55) × (41)ı	m		•	•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m 	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (an	nual) fro	m Table	e 3							0		(58)
Primary circuit				,		` '	` '						
(modified by				·	1	i		· ·				1	4
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.91	44.31	47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input of	calculated	using App	endix G or	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	l lines if	FGHRS	and/or V	NWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter		!				!		!		•	
(64)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
	l	l .		l		·	Outp	out from wa	ater heate	<u>I </u>	12	1973.65	(64)
Heat gains from	m water	heating	k\/\/h/ma	onth 0 2	5 ′ [0 85	× (45)m					1	1	_
(65)m= 61.99		riodaii ig,	100011/1110		0 [0.00	X (10)11	. (0://:	.,	ι (10)	. (0,,,,,,	. (00)111	1	
	I 54.16	56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
. ,	54.16	56.26	49.73	48.07	42.17	40.15	45 dwelling	45.5	52.04	55.8	60.43	eating	(65)
include (57)	m in calc	culation o	of (65)m	only if c	<u> </u>					<u> </u>		eating	(65)
include (57)	m in cald ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>					<u> </u>		eating	(65)
include (57) 5. Internal ga Metabolic gain	m in calc ains (see as (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal ga Metabolic gain Jan	m in caldains (see s (Table	culation of Table 5 (5), Wat Mar	of (65)m and 5a ts Apr	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal game Metabolic gain Jan (66)m= 119.19	m in cald ains (see s (Table Feb 119.19	ETable 5 5), Wat Mar	of (65)m and 5a ts Apr 119.19	only if control only if contro	Jun	Jul 119.19	Aug	or hot w	ater is fr	om com	munity h	neating	(65)
include (57) 5. Internal ga Metabolic gain Jan (66)m= 119.19 Lighting gains	m in calc ains (see s (Table Feb 119.19 (calcula	Table 5 Table	of (65)m and 5a ts Apr 119.19	only if construction only if c	Jun 119.19	Jul 119.19 r L9a), a	Aug 119.19	Sep 119.19 Table 5	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81	m in calconins (see Feb 119.19 (calcula 16.71	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraint of the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraint of the constraints on the constraint on th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	om com	munity h	neating	
include (57) 5. Internal ga Metabolic gain Jan (66)m= 119.19 Lighting gains	m in calconins (see Feb 119.19 (calcula 16.71	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraint of the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraint of the constraints on the constraint on th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a 7.01	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81	m in calconins (see Feb 119.19 (calcula 16.71	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraint of the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraint of the constraints on the constraint on th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc	Table 5 25), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68	of (65)m and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L	Jul 119.19 r L9a), a 7.01 13 or L1	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 See Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	neating	(66) (67)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc	Table 5 25), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68	of (65)m and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L	Jul 119.19 r L9a), a 7.01 13 or L1	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 See Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	eating	(66) (67)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01 Cooking gains	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92	Table 5 5), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68 tted in Ap 34.92	of (65)m and 5a ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33 201.7	neating	(66) (67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01 Cooking gains (69)m= 34.92	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92	Table 5 5), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68 tted in Ap 34.92	of (65)m and 5a ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33 201.7	eating	(66) (67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail (70)m= 3	m in calc ains (see s (Table Feb 119.19 (calcula: 16.71 ins (calc 213.2 (calcula: 34.92 ns gains 3	ted in Apulated in	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 3	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	neating	(66) (67) (68) (69)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail	m in calc ains (see s (Table Feb 119.19 (calcula: 16.71 ins (calc 213.2 (calcula: 34.92 ns gains 3	ted in Apulated in	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 3	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail (70)m= 3 Losses e.g. ev (71)m= -95.35	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5	of (65)m ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92 5a) 3 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7 34.92	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T	ted in Ap 13.59 ulated in Ap 34.92 (Table 5 3 on (negatine) and (n	of (65)m and 5a ts Apr 119.19 pendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ole 5)	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92 3	Nov 119.19 18.14 187.76 34.92	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5 3 on (negation) 75.62	of (65)m ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92 5a) 3 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ble 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.14 187.76 34.92 3	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31 Total internal	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T 80.59 gains =	ted in Ap 13.59 ulated in Ap 207.68 at 14.92 (Table 5 3 on (negation) 75.62	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ole 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92 3 -95.35	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3 -95.35	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35 69.95 70)m + (7	Nov 119.19 18.14 187.76 34.92 3 -95.35 77.5 1)m + (72)	Dec 119.19 19.33 201.7 34.92 3 81.22 m	neating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T 80.59 gains =	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5 3 on (negation) 75.62	of (65)m and 5a ts Apr 119.19 pendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ble 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.14 187.76 34.92 3	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

					_										
Southwest _{0.}	<u> </u>	x	0.6	S5	X	10	04.39] [0.24	X	0.7	=	7.9	(79)
Southwest _{0.}	9x 0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	-	59.	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	9	2.85] [0.24	X	0.7		7.0	3 (79)
Southwest _{0.}	9x 0.77	×	5.5	51	x	6	9.27] [0.24	x	0.7		44.4	13 (79)
Southwest _{0.}	9x 0.77	X	0.6	S5	x [6	9.27] [0.24	x	0.7	=	5.2	4 (79)
Southwest _{0.}	9x 0.77	X	5.5	51	x [4	4.07] [0.24	x	0.7	=	28.2	27 (79)
Southwesto.	9x 0.77	x	0.6	35	x	4	4.07			0.24	x	0.7	=	3.3	4 (79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	3	1.49] [0.24	X	0.7		20.	2 (79)
Southwest _{0.}	9x 0.77	X	0.6	35	x [3	1.49			0.24	x	0.7		2.3	8 (79)
					-										
Solar gains	s in watts, c	alculated	l for eac	h month				(83)m	= Su	ım(74)m .	(82)m				
(83)m= 45.	33 83.51	130.97	190.29	238.71	24	18.23	234.64	196.	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	· (84)m =	= (73)m ·	+ (8	33)m	, watts					-	_	_	
(84)m= 420	.22 455.76	489.61	527.34	553.86	54	12.21	515.23	483.	.82	449.62	416.98	400.59	402.07	7	(84)
7. Mean ir	nternal temp	perature	(heating	season)										
	ure during h		, ,		<i>'</i>	area f	from Tab	ole 9,	Th1	1 (°C)				2	(85)
•	factor for g	٠.			-					` ,					
Ja		Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	:	
(86)m= 1	1	0.99	0.98	0.93	0).78	0.6	0.6	Ť	0.9	0.99	1	1		(86)
Mean into	rnal tempe	ature in	livina ar	oa T1 (fa	د الد	w cto	ns 3 to 7	I 7 in T	able) (Oc)		1	<u> </u>		
(87)m= 19.		20.24	20.52	20.78		0.95	20.99	20.9	_	20.87	20.55	20.2	19.92		(87)
` '				l				l				1	1 .0.02		(- /
· -	ure during h	· ·		·					$\overline{}$	<u> </u>	00.44	1 00 44	00.4		(00)
(88)m= 20.	09 20.1	20.1	20.11	20.11		0.12	20.12	20.1	12	20.12	20.11	20.11	20.1		(88)
Utilisation	factor for g	ains for	rest of d	welling,	h2,ı	m (se	e Table	9a)						_	
(89)m= 1	1	0.99	0.97	0.9	(0.7	0.49	0.5	55	0.84	0.98	1	1		(89)
Mean inte	rnal tempe	ature in	the rest	of dwelli	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m= 18.	67 18.82	19.11	19.52	19.88	20	0.08	20.12	20.1	12	20.01	19.57	19.06	18.65		(90)
										f	LA = Livi	ng area ÷ (4) =	0.2	6 (91)
Mean inte	rnal tempe	ature (fo	r the wh	ole dwe	llind	a) = fl	_A × T1	+ (1 -	– fL	A) x T2					
(92)m= 18.		19.4	19.78	20.11	_	20.3	20.34	20.3		20.23	19.82	19.35	18.97		(92)
	ustment to t	he mean	interna	l temper	ı atuı	re fro	m Table	4e, \	whe	re appro	priate	Į	<u> </u>		
(93)m= 18.	<u> </u>	19.25	19.63	19.96	_	0.15	20.19	20.	$\overline{}$	20.08	19.67	19.2	18.82		(93)
8. Space	heating req	uirement													
Set Ti to t	he mean in	ternal ter	nperatu	re obtair	ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
the utilisat	tion factor f	or gains	using Ta	ble 9a								1		_	
	n Feb	Mar	Apr	May	_ \	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	;	
	factor for g				_							1			
(94)m= 1		0.99	0.97	0.89	(0.7	0.5	0.5	6	0.84	0.97	0.99	1		(94)
	ins, hmGm	· `	<u> </u>		T		050.00		T	077.00	100.04	1 000 40	1 404 04		(05)
(95)m= 419		484.23	509.25	492.35	<u> </u>	31.97	258.06	269.	.75	377.66	406.21	398.42	401.22	2	(95)
	verage exte	1	i –	1	_		16.6	16	<u>, T</u>	111	10.6	74	4.2		(96)
` '		6.5	8.9	11.7		4.6	16.6	16.		14.1	10.6	7.1	4.2		(90)
	rate for me	r	790.36	607.15		, VV =	260.46	X [(93		- (96)M 435.82	J 666.36	893.66	1085.6	5	(97)
(31)111= 1090	5.17 1033.16	301.43	130.30	007.10	L 40	JZ.03	200.40	L 2/4.	.00	400.02	000.30	093.00	1000.0		(01)

Space heatir (98)m= 499.7	403.31	347.6	202.4	85.41	0	0	0	0	193.56	356.57	509.21		
		<u> </u>	ļ				Tota	l per year	<u> </u>		Ь Н	2597.76	(98)
Space heatir	ng require	ement in	kWh/m²	²/year								34.15	(99)
8c. Space co	ooling red	quiremer	nt								L		
Calculated fo	r June,	July and	August.	See Tal	ole 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rat	e Lm (ca	lculated	using 2	5°C inter	nal tem	perature	and exte	ernal ten	nperatur	e from T	able 10)		
100)m= 0	0	0	0	0	681.81	536.74	549.81	0	0	0	0		(10
Utilisation fac	i	i —	ı	ı		i			ı	i			
101)m= 0	0	0	0	0	0.87	0.93	0.91	0	0	0	0		(10
Useful loss, I	 		` 	<u> </u>		1				1			
102)m= 0	0	0	0	0	595.19	501.61	502.07	0	0	0	0		(102
Gains (solar													(4.0)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0	0	713.8	680.73	645.01	0	0	0	0	(44)	(10:
Space coolir set (104)m to	•				iweiiing,	continu	ous (KVV	(n) = 0.0	24 X [(10)3)m – (102)m]	((41)m	
104)m= 0	0	0	0	0	85.4	133.26	106.34	0	0	0	0		
,		<u> </u>	<u> </u>	l		<u> </u>		 Total	l = Sum(1.04)	=	325.01	(104
cooled fractio	n									area ÷ (4	4) =	0.59	(10
ntermittency	factor (Ta	able 10b)								· L		
106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
								Total	I = Sum((104)	=	0	(106
Space cooling		ment for	month =	(104)m	× (105)	× (106)r							
07)m= 0	0	0	0	0	12.49	19.49	15.55	0	0	0	0		_
								Total	l = Sum(107)	=	47.54	(10
space cooling	requirer	ment in k	kWh/m²/	year				(107)) ÷ (4) =			0.63	(10
a. Energy re	quiremer	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	HP)					
Space heati	_										,		_
Fraction of s	pace hea	at from s	econdar	y/supple	mentary	system						0	(20
Fraction of s	pace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(20
Fraction of to	tal heati	ng from	main sy	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(20
Efficiency of	main spa	ace heat	ing syste	em 1							Ì	89.5	(20
Efficiency of	seconda	ry/suppl	ementar	y heating	a system	າ, %					[0	(20
Cooling Syst					<i>,</i>	,					l [4.73	(20
								0		NI.	<u> </u>		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heatir	403.31	347.6	202.4	85.41	0	0	0	0	193.56	356.57	509.21		
		<u> </u>	<u> </u>	ļ				U	190.00	330.37	JU3.21		
211)m = {[(98	i												(21
558.33	450.63	388.38	226.15	95.43	0	0	0	0	216.26	398.4	568.95		¬
							Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	F	2902.53	(21
Space heatir	•		• , .	month									
{[(98)m x (2	1	ľ	ĭ										
215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(21

Water heating									
Output from water heater (calculated above) 199.05 173.88 180.91 160.46 155.35 1	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
Efficiency of water heater	100.02	101.00	110.10		100.21	170.00	101.00	89.5	(216)
· · · · · · · · · · · · · · · · · · ·	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(217)
Fuel for water heating, kWh/month									
$(219)m = (64)m \times 100 \div (217)m$ (219)m = 222.41 194.28 202.13 179.28 173.58 1	152.88	146.47	163.28	165.08	187.98	200.66	217.18		
(210)111 222.41 154.20 252.10 175.20 176.50 1	102.00	140.47		I = Sum(2		200.00	217.10	2205.19	(219)
Space cooling fuel, kWh/month.									」、
(221)m = (107) m÷ (209)								1	
(221)m= 0 0 0 0 0	2.64	4.13	3.29	0 I = Sum(22	0	0	0	10.06	(221)
Appropriate to tale			Tota	ii – Gairi(22		Alla la casa s		10.06	
Annual totals Space heating fuel used, main system 1					K	Wh/year		kWh/year 2902.53	7
Water heating fuel used								2205.19	<u> </u>
Space cooling fuel used								10.06	<u> </u>
Electricity for pumps, fans and electric keep-hot							'		
mechanical ventilation - balanced, extract or pos	sitive in	put fron	n outside	Э			162.85		(230a)
central heating pump:									
							30		(230c)
Total electricity for the above, kWh/year			sum	of (230a).	(230g) =		30	192.85	(230c) (231)
Total electricity for the above, kWh/year Electricity for lighting			sum	of (230a).	(230g) =		30	192.85 332.22	_ `
	ns inclu	ding mi			(230g) =		30		(231)
Electricity for lighting	Ene	ding mid e rgy h/year				ion fac			(231)
Electricity for lighting	Ene	e rgy h/year			Emiss	ion fac 2/kWh		332.22 Emissions	(231)
Electricity for lighting 12a. CO2 emissions – Individual heating system	Ene kWl	ergy h/year			Emiss kg CO	ion fac 2/kWh	tor	332.22 Emissions kg CO2/yea	(231) (232)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1)	Ene kWI (211)	ergy h/year) ×			Emiss kg CO	ion fac 2/kWh 16	tor =	Emissions kg CO2/yea 626.95	(231) (232) (261)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Ene kWI (211) (215) (219)	ergy h/year) ×) ×			Emiss kg CO2	ion fac 2/kWh 16	tor = =	332.22 Emissions kg CO2/yea 626.95	(231) (232) (261) (263)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kWI (211) (215) (219)	ergy h/year) x) x) x	cro-CHP		Emiss kg CO2	ion fac 2/kWh 16 19 16	tor = =	332.22 Emissions kg CO2/yea 626.95 0 476.32	(231) (232) (232) (261) (263) (264)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Ene kWI (211) (215) (219) (261)	ergy h/year) x) x) x) + (262) -	cro-CHP		Emiss kg CO2 0.2 0.5 0.2	ion fac 2/kWh 16 19 16	tor = = =	332.22 Emissions kg CO2/yea 626.95 0 476.32 1103.27	(231) (232) (232) (261) (263) (264) (265)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling	Ene kWI (211) (215) (219) (261) (221)	ergy h/year) x) x) x) + (262) -	cro-CHP		Emiss kg CO2 0.2 0.5 0.5	ion fac 2/kWh 16 19 16	tor	332.22 Emissions kg CO2/yea 626.95 0 476.32 1103.27 5.22	(231) (232) (232) (261) (263) (264) (265) (266)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot	Ene kWl (211) (215) (219) (261) (221) (231)	ergy h/year) x) x) x) + (262) -	cro-CHP	(264) =	Emiss kg CO2 0.2 0.5 0.5 0.5	ion fac 2/kWh 16 19 16	tor = = = = =	332.22 Emissions kg CO2/yea 626.95 0 476.32 1103.27 5.22 100.09	(231) (232) (232) (261) (263) (264) (265) (266) (267)
Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot Electricity for lighting	Ene kWl (211) (215) (219) (261) (221) (231)	ergy h/year) x) x) x) + (262) -	cro-CHP	(264) = sum o	Emiss kg CO: 0.2 0.5 0.5 0.5 0.5	ion fac 2/kWh 16 19 16	tor = = = = =	332.22 Emissions kg CO2/yea 626.95 0 476.32 1103.27 5.22 100.09 172.42	(231) (232) (232) (261) (263) (264) (265) (266) (267) (268)

		l Isar I	Details:						
Assessor Name:	Chris Hocknell	— 036 1-1	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	Flat 2-	1-Lean				
Address: 1. Overall dwelling dime	naiona:								
1. Overall dwelling diffle	11510115.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) :	74.06	(4)			.		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
2. Vertilation rate.	main seconda heating heating	ry	other		total			m³ per hou	r
Number of chimneys		- + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0		0	j = [0	x	20 =	0	(6b)
Number of intermittent fa	ns			, <u> </u>	0	x .	10 =	0	(7a)
Number of passive vents				Ē	0	x .	10 =	0	(7b)
Number of flueless gas fi	res			F	0	x	40 =	0	(7c)
				_					
							Air ch	nanges per ho	our —
•	ys, flues and fans = (6a)+(6b)+(een carried out or is intended, procee			continue fr	0		÷ (5) =	0	(8)
Number of storeys in the		id 10 (17),	ourer wise t	onunae n	om (9) to	(10)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
it both types of wall are prideducting areas of opening	resent, use the value corresponding t ngs); if equal user 0.35	o tne grea	ter wall are	a (atter					
•	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	·							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
•	ity value, then $(18) = [(17) \div 20] + (18)$							0.15	(18)
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed	ĺ	_	740
Number of sides sheltere Shelter factor	u		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorporat	ing shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind speed						l		
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7				•			1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rate (a	allowin	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0).16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effe		-	ate for t	he appli	cable ca	se	•	!	•				
	al ventilation		- d'a N. (O	OL) (00 ·		(/	NEW - de-		\ (00-)		ļ	0.5	(23a
If exhaust air h) = (23a)		ļ	0.5	(23k
	h heat recovery		-	_								76.5	(230
a) If balance						- 	- 	í `	r Ó Ó		r ` ´	÷ 100]	(0.4
(24a)m= 0.28	ļ l).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(248
b) If balance						, , `	MV) (24k	í `	2b)m + (2	<u> </u>			
(24b)m= 0		0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h if (22b)r	nouse extrac n < 0.5 × (23								.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilation on the contract ventilation of the contract ventilation ventilation of the contract ventilation ve								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate	e - ent	ter (24a	or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28	0.28 0).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losse	s and heat l	loss pa	aramete	er:			•						
ELEMENT	Gross area (m²		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/l	<)	k-value kJ/m²-ł		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type	e 4				0.65	x1	/[1/(1.2)+	0.04] =	0.74	=			(27)
Walls Type1	67.78	7 1	20.58	3	47.2	x	0.15	i	7.08	<u> </u>			(29)
Walls Type2	24.47	7	2.6	=	21.87	=	0.15	=	3.28	=			(29)
Walls Type3	5.93	╡╏	0	=	5.93	=	0.15	=	0.89	-		7 H	(29)
Total area of e		 2			98.18	=	00		0.00				(31)
Party wall	, , , , , , , , , , , , , , , , , , , ,				12.38	=	0		0	— [(32)
Party floor						=			U			╡┝	(32)
					74.06	=						-	
-					. /// ()/-) I				L			(32)
Party ceiling	I roof windows	uso off	factiva wi	ndow II v	74.06		a formula 1	/[/1/ L val	10 1 1 0 0 1 1 0	e aivon in	naraaranh	22	
-					alue calcul		g formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	n paragraph	3.2	
Party ceiling * for windows and ** include the area	as on both side	es of inte	ernal wali		alue calcul		g formula 1 (26)(30		ıe)+0.04] a	s given in	n paragraph	37.93	(33)
Party ceiling * for windows and ** include the area Fabric heat los	as on both side ss, W/K = S	es of inte	ernal wali		alue calcul) + (32) =	ue)+0.04] a				=
Party ceiling * for windows and	as on both side ss, W/K = S Cm = S(A x	es of inte (A x U (k)	ernal wali J)	ls and par	alue calcul titions	lated using) + (32) = ((28).		2) + (32a).		37.93	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both side ss, W/K = S Cm = S(A x s parameter sments where is	es of into (A x U (k) (TMP the deta	ernal wali J) = Cm ÷	s and par - TFA) ir	alue calcul titions	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	as on both side ss, W/K = S Cm = S(A x s parameter sments where is ead of a detailed	es of into (A x U (k) (TMP the detailed calcul	ernal wall J) = Cm ÷ ails of the lation.	s and par - TFA) ir construct	alue calcul titions n kJ/m²K ion are no	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(33) 1 (34) (35)

Total fabric	heat loss							(33) +	(36) =			48.97	(37)
Ventilation	heat loss c	alculated	d monthly	y				(38)m	= 0.33 × ((25)m x (5)			
Ja	ın Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.	.8 17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat transf	er coefficie	nt, W/K	•			•	•	(39)m	= (37) + (38)m		•	
(39)m= 66.	77 66.57	66.36	65.35	65.15	64.14	64.14	63.93	64.54	65.15	65.55	65.96		
Heat loss p	arameter (I	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.} - (4)	12 /12=	65.3	(39)
(40)m= 0.9	`	0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
Number of	days in mo	nth (Tah	lo 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Number of Ja	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 3°	_	31	30	31	30	31	31	30	31	30	31		(41)
		!	<u> </u>	ļ	ļ.	<u>I</u>	<u> </u>	<u> </u>			<u> </u>		
4 Water h	neating ene	rav reaui	irement:								kWh/ye	ear:	
4. Water i	icating cho	igy icqu	iromont.								ICVVIII y C	Jui.	
Assumed o			, [1 ovp	(0 0002) 40 v /TE	-A 12 O)2)] . O (0012 v /	ΓΕΛ 1 2		34		(42)
	13.9, N = 1 13.9, N = 1	+ 1.70 X	i i - exp	(-0.0003	349 X (1 г	-A -13.9)2)] + 0.0) X C I UC	IFA - 13	.9)			
Annual ave											.79		(43)
Reduce the a	_				_	-	to achieve	a water us	se target o	r ^t			
Ja		Mar	Apr	May	Jun	Jul	۸۰۰۵	Sep	Oct	Nov	Dec		
Hot water usa		1					Aug (43)	Sep	Oct	INOV	Dec		
(44)m= 98.	77 95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
` ′			l					-	Γotal = Su	m(44) ₁₁₂ =		1077.45	(44)
Energy conte	nt of hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 146	.47 128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		_
If instantaneo	us water heati	ina at point	t of use (no	hot water	r storage)	enter () in	hoxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
(46)m= 21.9		19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water stora	1	19.63	17.29	16.59	14.31	13.20	15.22	15.4	17.95	19.59	21.20		(40)
Storage vo	_) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If communi	ty heating a	and no ta	ank in dw	elling, e	nter 110	litres in	(47)					!	
Otherwise i		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water stora	•		(- /1.14/1	. / .1 \						I	
,	facturer's d			or is kno	wn (kvvr	1/day):					0		(48)
Temperatu							(40) (40)				0		(49)
Energy lost	trom water facturer's d	_	-		or is not		(48) x (49)) =			0		(50)
Hot water s			-								0		(51)
If communi			on 4.3										
Volume fac			Oh								0		(52)
Temperatu							(47) := :		- 0)		0		(53)
Energy lost	: from wate or (54) in (_	e, KVVh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54) (55)
Linci (50)	O1 (O7) III (<i>,</i>									0		(33)

Water stor	age loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder co	ntains dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary cir	rcuit loss (ar	nnual) fro	om Table	3							0		(58)
Primary ci	rcuit loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modifie	d by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	s calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50	.33 43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat	required for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW ir	nput calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additi	ional lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	m water hea	iter	-		-	-	-		-	-	-		
(64)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	•	•	•		•		Outp	out from w	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains	s from water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 61	.28 53.55	55.62	49.17	47.52	41.69	39.7	44.49	44.99	51.46	55.17	59.75		(65)
			1	_	1	1 00.7	44.43	44.55	31.40	33.17	39.73		(00)
include (culation (u of (65)m		<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	l eating	(00)
	` ,			only if c	<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	eating	(00)
5. Interna	al gains (see	e Table 5	and 5a	only if c	<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	eating	(66)
5. Interna	` ,	e Table 5	and 5a	only if c	<u> </u>	<u> </u>	dwelling	or hot w	ļ	ļ	munity h	eating	(55)
5. International Metabolic	al gains (see	E Table 5	and 5a	only if c	ylinder i	s in the o	ļ		ater is fr	om com	ļ	eating	(66)
5. International Metabolic (66)m= 117	gains (Table an Feb 7.03 117.03	E Table 5 E 5), Wat Mar 117.03	ts Apr 117.03	only if constant of the consta	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. International Metabolic Metabolic (66)m= 117 Lighting ga	al gains (see gains (Table an Feb	E Table 5 E 5), Wat Mar 117.03	ts Apr 117.03	only if constant of the consta	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. International Metabolic (66)m= 117 Lighting games (67)m= 18	gains (Table gains (Table an Feb 7.03 117.03 ains (calcula	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3	ts Apr 117.03 ppendix 10.07	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances	gains (Table an Feb 7.03 117.03 ains (calcula 16.36 s gains (calcula	Mar 117.03 ted in Ap 13.3	ts Apr 117.03 Dependix 10.07 Append	May 117.03 L, equat 7.53 dix L, eq	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206	gains (Table an Feb 7.03 117.03 eins (calcula 42 16.36 s gains (calcula 5.58 208.73	Mar 117.03 ted in Ap 13.3 culated ir 203.32	ts	May 117.03 L, equat 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
5. International Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga	gains (Table an Feb 7.03 117.03 ains (calcula 16.36 s gains (calcula	Mar 117.03 ted in Ap 13.3 culated ir 203.32	ts	May 117.03 L, equat 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
5. International Metabolic (66)m=	al gains (see gains (Table an Feb 7.03 117.03 ains (calcula see gains	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and	gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 s gains (calcula 5.58 208.73 ains (calcula	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 32 Pumps and (70)m= 33	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 6.58 208.73 ains (calcula 4.7 34.7 d fans gains 3 3	Mar 117.03 ted in Ap 13.3 culated ir 203.32 ated in A 34.7 (Table \$	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.ga	gains (Table gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula 5.58 208.73 ains (calcula 4.7 34.7 d fans gains	Mar 117.03 ted in Ap 13.3 culated ir 203.32 ated in A 34.7 (Table \$	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g. (71)m= -93	gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula 5.58 208.73 ains (calcula 1.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5	ts Apr 117.03 Appendix 10.07 Appendix 191.82 Appendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic Metabolic Ji (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g (71)m= -93 Water hea	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5	ts Apr 117.03 Appendix 10.07 Appendix 191.82 Appendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. International Metabolic (66)m=	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62 ting gains (7	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negation of the second of the seco	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)
5. International Metabolic (66)m= 117 Lighting gate (67)m= 18 Appliances (68)m= 206 Cooking gate (69)m= 32 Pumps and (70)m= 32 Losses e.g. (71)m= -93 Water head (72)m= 82 Total international Metabolic (72)m= 82	al gains (see gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62 ting gains (7.37 79.68	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negation of the second of the seco	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southwestg, 9s, 0.77									. ,						_		_
Southwesto, s, 0.77 x 0.65 x 0.235	Southwest _{0.9x}	0.77	×	0.6	S5	X	10	04.39] [0.24	X	0.7		= <u>L</u>	7.9	(79)
Southwesto 9x	Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	-	- [59.56	(79)
Southwesti, 94	Southwest _{0.9x}	0.77	x	0.6	35	X	9	2.85] [0.24	X	0.7	=	= [7.03	(79)
Southwesto 3x	Southwest _{0.9x}	0.77	X	5.5	51	x	6	9.27] [0.24	X	0.7	-	= [44.43	(79)
Southwesto 3x	Southwest _{0.9x}	0.77	X	0.6	35	x	6	9.27] [0.24	X	0.7	-	= [5.24	(79)
Southwesto,ax	Southwest _{0.9x}	0.77	X	5.5	51	X	4	4.07] [0.24	X	0.7	-	= [28.27	(79)
Solar gains in watts, calculated for each month (83)me Sun(74)m (82)m Solar gains in watts, calculated for each month (83)me Sun(74)m (82)m 45.33 83.51 130.97 190.29 238.71 248.23 234.64 196.79 151.24 96.8 55.44 38.05 Total gains – internal and solar (84)m = (73)m + (83)m, watts (84)me 13.81 449.38 483.46 21.55 548.52 537.26 510.51 479.03 444.62 411.55 394.75 395.86 (84)me Note of the preference (beating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h.1,m (see Table 9a) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 20.07 20.17 20.36 20.62 20.85 20.97 21 20.99 20.92 20.92 20.64 20.31 20.05 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 20.17 20.17 20.36 20.62 20.85 20.97 21 20.99 20.92 20.92 20.64 20.31 20.05 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 1 1 1 0.99 0.96 0.87 0.85 0.45 0.5 0.8 0.97 1 1 1 (89) Wellisation factor for gains for rest of dwelling. h2,m (see Table 9a) Utilisation factor for gains for rest of dwelling 122 (follow steps 3 to 7 in Table 9c) (89)me 1 1 1 0.99 0.96 0.87 0.85 0.45 0.5 0.8 0.97 1 1 1 (89) Mean internal temperature in the rest of dwelling 122 (follow steps 3 to 7 in Table 9c) (89)me 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.20 20.12 19.75 19.27 18.89 (90) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (82)me 19.21 19.35 19.8 19.8 19.8 20.25 20.39 20.41 20.4 20.4 20.33 19.88 19.55 19.2 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (32)me 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains, hm: (94)me 1 0.99 0.96 0.86 0.86 0.86 0.46 0.51 0.8 0.97 0.99 1 0.99 1 0.99 0.96 0.86	Southwest _{0.9x}	0.77	X	0.6	35	x	4	4.07] [0.24	X	0.7	-	= [3.34	(79)
Solar gains in watts, calculated for each month (83)m= 45.33 83.51 130.97 190.29 238.71 248.23 234.64 196.79 151.24 96.8 55.44 38.05 (83)m= 45.33 83.51 130.97 190.29 238.71 248.23 234.64 196.79 151.24 96.8 55.44 38.05 (84)m= 413.81 449.38 483.46 521.58 548.52 537.26 510.51 479.03 444.62 411.58 394.75 395.66 (84)m= 413.81 449.38 483.46 521.58 548.52 537.26 510.51 479.03 444.62 411.58 394.75 395.66 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 [85] Utilisation factor for gains for living area, h1, m (see Table 9a) Utilisation factor for gains for living area T1 (follow steps 3 to 7 in Table 9c) [86]m= 1 1 1 0.99 0.97 0.9 0.73 0.55 0.6 0.86 0.98 1 1 1 Comperature during heating periods in rest of dwelling from Table 9, Th2 (°C) [88]m= 20.07 20.17 20.38 20.62 20.85 20.97 21 20.99 20.92 20.84 20.31 20.05 (87)m= 20.07 20.17 20.38 20.62 20.85 20.97 21 20.99 20.92 20.19 20.18 20.18 20.18 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) [89]m= 1 1 0.99 0.96 0.87 0.86 0.45 0.5 0.8 0.97 1 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) [90]m= 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.20 20.2 20.12 19.75 19.27 18.89 (90) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 [92]m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.33 19.98 19.55 19.2 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate [93]m= 19.06 19.2 19.45 19.81 20.1 20.2 20.2 20.2 20.2 20.18 19.83 19.4 19.05 (93) Seace heating requirement Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains, hm: [94]m= 1 0.99 0.99 0.96 0.88 0.88 0.85 0.46 0.51 0.8 0.97 0.99 1 0.99 1 0.99 0.99 0.99 0.99 0.99	Southwest _{0.9x}	0.77	X	5.5	51	x	3	1.49] [0.24	X	0.7	=	<u> </u>	20.2	(79)
(83) (8	Southwest _{0.9x}	0.77	X	0.6	S5	x	3	1.49] [0.24	X	0.7		- [2.38	(79)
(83) (8																	
Total gains — internal and solar (84)m = (73)m + (83)m, watts (84)m= 413.81 449.38 483.46 521.58 548.52 537.26 510.51 479.03 444.62 411.58 394.75 395.86 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C)	Solar gains in	watts, ca	alculated	for eac	h month	_			(83)m	= St	um(74)m .	(82)m			_		
Ref	` '	<u> </u>			<u> </u>			<u> </u>	196.	.79	151.24	96.8	55.44	38.05	5		(83)
7. Mean Internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Total gains –	internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts					-		_		
Temperature during heating periods in the living area from Table 9, Th1 (°C)	(84)m= 413.81	449.38	483.46	521.58	548.52	53	37.26	510.51	479.	.03	444.62	411.58	394.75	395.8	6		(84)
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 1 1 1 0.99 0.97 0.9 0.73 0.55 0.6 0.86 0.98 1 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.07 20.17 20.36 20.62 20.85 20.97 21 20.99 20.92 20.64 20.31 20.05 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.17 20.17 20.17 20.18 20.18 20.18 20.2 20.2 20.2 20.2 20.19 20.18 20.18 20.18 20.18 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.96 0.87 0.65 0.45 0.5 0.8 0.97 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.2 20.12 19.75 19.27 18.89 (90) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.3 19.98 19.55 19.2 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set T1 to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains. using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.99 0.96 0.86 0.86 0.85 0.46 0.51 0.8 0.97 0.99 1 0.99 1 0.94 Useful gains, hmGm, W = (94)m x (84)m (95)m= 41.26 3 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.6 16.4 14.1 10.6 7.1 4.2 (96)	7. Mean inte	rnal temp	erature	(heating	season)											
Sep Oct Nov Dec Nov Nov Dec Nov Nov Dec Nov Nov Dec Nov Dec Nov Nov Dec Nov Nov Nov Dec Nov Nov Nov Dec Nov	Temperature	during h	neating p	eriods ir	n the livi	ng a	area f	from Tal	ole 9,	Th′	1 (°C)					21	(85)
Resignation 1	Utilisation fac	ctor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)									
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec			
Ref 20.07 20.17 20.36 20.62 20.85 20.97 21 20.99 20.92 20.64 20.31 20.05	(86)m= 1	1	0.99	0.97	0.9	().73	0.55	0.6	6	0.86	0.98	1	1			(86)
Ref 20.07 20.17 20.36 20.62 20.85 20.97 21 20.99 20.92 20.64 20.31 20.05	Mean interna	al temper	ature in	living are	ea T1 (fo	ollo	w ste	ps 3 to 7	7 in T	able	e 9c)						
(88)me		'	1		<u>`</u>	_						20.64	20.31	20.05	;		(87)
(88)me	Temperature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	hle C	Th	n2 (°C)		•	•			
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.96 0.87 0.65 0.45 0.5 0.8 0.97 1 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.2 20.12 19.75 19.27 18.89 (90) **ILA = Living area ÷ (4) = 0.26 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92)m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.33 19.98 19.55 19.2 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((93)m x [·	_		·		_	<u> </u>	20.18	20.18	20.18	3		(88)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) FLA = Living area ÷ (4) = 0.26 (91)			oloo for		المنالية	<u> </u>	/	L Table	00)				_l	l			
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.2 20.12 19.75 19.27 18.89 ItA = Living area + (4) = 0.26 Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 − fLA) x T2 (92)m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.33 19.98 19.55 19.2 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(, 	1			_		·	 	5 1	0.8	0.97	1	1	\neg		(89)
(90)m= 18.91 19.06 19.34 19.72 20.03 20.18 20.19 20.2 20.12 19.75 19.27 18.89 (90) FLA = Living area ÷ (4) =	` /	1	l		l	<u> </u>		l						<u> </u>			(00)
Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2			1		i			i	i 				1		\neg		(00)
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.33 19.98 19.55 19.2 Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]	(90)m= 18.91	19.06	19.34	19.72	20.03	2	0.18	20.19	20.	.2					<u>'</u>		_ ` ′
(92)m= 19.21 19.35 19.6 19.96 20.25 20.39 20.41 20.4 20.33 19.98 19.55 19.2 Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m- (96)m)											I	LA = LIV	ilig alea ÷ (+) =	L	0.26	(91)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]		al temper	ature (fo			lling	g) = fl	LA × T1	+ (1 -	– fL	A) × T2		i	1	_		
(93)m= 19.06 19.2 19.45 19.81 20.1 20.24 20.26 20.25 20.18 19.83 19.4 19.05 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]	. ,				<u> </u>				<u> </u>				19.55	19.2			(92)
8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm, W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]		1	1			_			r	$\overline{}$			ı	ī	_		(22)
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]					20.1	2	0.24	20.26	20.2	25	20.18	19.83	19.4	19.05			(93)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm:							-1 -1	44 . (.	- 01			(70)	1		l- (-	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]				•		nea	at ste	ер 11 от	rabi	e 90	o, so tha	t 11,m=	:(76)m an	a re-ca	aicu	late	
Utilisation factor for gains, hm:		1			1		Jun	Jul	Αι	ua	Sep	Oct	Nov	Dec	\Box		
(94)m= 1 0.99 0.99 0.96 0.86 0.65 0.46 0.51 0.8 0.97 0.99 1 Useful gains, hmGm, W = (94)m x (84)m (95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, W = [(39)m x [(93)m - (96)m]					,					<u> </u>			1				
(95)m= 412.63 447.02 477.28 499.41 472.37 351.36 233.51 244.7 357.49 398.68 392.37 395 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m]					0.86	(0.65	0.46	0.5	51	0.8	0.97	0.99	1			(94)
Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]]	Useful gains	, hmGm	, W = (9 ⁴	4)m x (8	4)m								-				
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m— (96)m]	(95)m= 412.63	447.02	477.28	499.41	472.37	35	51.36	233.51	244	.7	357.49	398.68	392.37	395			(95)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]	Monthly ave	age exte	rnal tem	perature	from T	able	e 8								_		
	(96)m= 4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2			(96)
(97)m= 985.69 952.08 859.71 712.96 547.07 361.47 234.42 246.45 392.5 601.36 806.03 979.22 (97)		1							 						_		
	(97)m= 985.69	952.08	859.71	712.96	547.07	36	61.47	234.42	246.	.45	392.5	601.36	806.03	979.2	2		(97)

(98)m= 426.36	g require	ement fo 284.53	r each n 153.76	nonth, k\ 55.58	Wh/mont	$\frac{1}{0} = 0.02$	24 x [(97))m – (95 0)m] x (4 150.8	1)m _{297.83}	434.67		
(98)111= 420.36	339.4	204.55	155.76	55.56	0	0				r) = Sum(9	-	2142.91	(98)
Space heatin	a requir	ement in	kWh/m²	² /vear				, , , , , , ,	(),	, (-	[28.93	(99)
8c. Space co	• •			•							L		
Calculated fo	Ĭ			See Tal	ole 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
100)m= 0	0	0	0	0	602.87	474.6	485.89	0	0	0	0		(100
Utilisation fac	tor for lo	ss hm				ī			r	1			
101)m= 0	0	0	0	0	0.92	0.97	0.95	0	0	0	0		(10
Useful loss, h	mLm (V	Vatts) = (100)m x	(101)m			· · · · · · · · · · · · · · · · · · ·			,			
102)m= 0	0	0	0	0	555.88	458.15	462.2	0	0	0	0		(102
Gains (solar									1	1			
103)m= 0	0	0	0	0	706.39	673.64	637.8	0	0	0	0		(103
Space cooling set (104)m to					lwelling,	continu	ous (kW	h') = 0.02	24 x [(10	03)m – (102)m] x	: (41)m	
104)m= 0	0	0	0	0	108.37	160.32	130.65	0	0	0	0		
						!	•	Total	= Sum(1.0.4)	=	399.33	(104
Cooled fraction	1							f C =	cooled	area ÷ (4	4) = [0.6	(10
ntermittency f	actor (Ta	able 10b											
106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
				(404)	(405)	(400)		Total	l = Sum((104)	= [0	(106
Space cooling	requirer 0	nent for	month =	(104)m	× (105)	× (106)r	n 19.63	0	0	0	0		
0	U	U	U	U	10.20	24.00	19.03				L		7(10
			NA # / 0/						= Sum(18087)	= [59.99	(107
Space cooling	· ·							` ′) ÷ (4) =		L	0.81	(108
a. Energy red		nts – Indi	vidual h	eating sy	ystems i	ncluding	j micro-C	CHP)					
Space heating	_	t from o		مامعييمان	monton	, avatam					Г		(20
Fraction of sp					mentary	system		(004)			Ļ	0	╡`
Fraction of sp			•	` ,			(202) = 1 -	` '			Ĺ	1	(20)
Fraction of to	tal heati	ng from i	main sys	stem 1			(204) = (204)	02) × [1 –	(203)] =		L	1	(204
Efficiency of I	nain spa	ace heat	ing syste	em 1								89.5	(20
Efficiency of	seconda	ry/supple	ementar	y heating	g system	າ, %					Γ	0	(208
Cooling Syste	em Ener	gy Efficie	ency Rat	tio							Ī	4.73	(20
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ ear
Space heatin			•			1	19			1		,	
426.36	339.4	284.53	153.76	55.58	0	0	0	0	150.8	297.83	434.67		
 211)m = {[(98	m x 120	(4)] } _Y 1	00 ± (20)6)	<u> </u>	!			!				(21 ⁻
476.38	379.22	317.91	171.8	62.1	0	0	0	0	168.49	332.77	485.66		(2)
		L						_		211) _{15,1012}		2394.31	(21
									,	r 10,1012	L		
Snace heatin	م) لمبيا م	pcondar	(/) k\//h/	month									
Space heatin	•		. , .	month									
Space heatin : {[(98)m x (20 215)m= 0	•		. , .	month 0	0	0	0	0	0	0	0		

Water heating								
Output from water heater (calculated above) 196.8 171.91 178.86 158.64 153.59 1	135.27 129.6	144.48	146.07	166.33	177.56	192.18	1	
Efficiency of water heater	135.27 129.0	144.40	146.07	100.33	177.50	192.10	89.5	(216)
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5 89.5	89.5	89.5	89.5	89.5	89.5	00.0	(217)
Fuel for water heating, kWh/month	ļ	1			l	<u> </u>	l	
(219) m = (64) m x $100 \div (217)$ m (219)m= 219.89 192.08 199.84 177.25 171.61 1	151.14 144.81	161.43	163.21	185.85	198.39	214.72	1	
(219)111= 219.09 192.00 199.04 177.25 171.01	151.14 144.61	1		19a) ₁₁₂ =	190.39	214.72	2180.21	(219)
Space cooling fuel, kWh/month. (221)m = (107)m÷ (209)			·	7112			2100.21	(210)
(221)m= 0 0 0 0 0	3.45 5.1	4.15	0	0	0	0		
	-	Total	= Sum(22	21) ₆₈ =	-	-	12.7	(221)
Annual totals				k'	Wh/year	•	kWh/yeaı	_
Space heating fuel used, main system 1							2394.31	╣
Water heating fuel used							2180.21	╛
Space cooling fuel used							12.7	
Electricity for pumps, fans and electric keep-hot							_	
mechanical ventilation - balanced, extract or pos	sitive input fro	m outside				158.57		(230a
central heating pump:						30		(230c
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			188.57	(231)
Electricity for lighting							325.25	(232)
12a. CO2 emissions – Individual heating system	ns including m	icro-CHP						
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/ye	
Space heating (main system 1)	(211) x			0.2	16	=	517.17	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	470.92	(264)
Space and water heating	(261) + (262)	+ (263) + (2	264) =				988.1	(265)
Space cooling	(221) x			0.5	19	=	6.59	(266)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	97.87	(267)
Electricity for lighting	(232) x			0.5	19	=	168.8	(268)
Total CO2, kg/year			sum o	f (265)(2	271) =		1261.36	(272)
Dwelling CO2 Emission Rate			(272)	÷ (4) =			17.03	(273)

El rating (section 14)

(274)

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	Property	Address	Flat 2-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:								
1. Overall awelling aime	,	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x	2	2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) ====	76.06	(4)			-		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins			Ī	0	x ′	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_			A in a b	ongoo nor he	
	, o flues and force (60) (6b) (70) . (7 b)	(70) -	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		(//				,		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wan are	a (anter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2	v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per ho					area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•				0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	ed		(20) 4	10 07E v (4	10)1			3	(19)
Shelter factor	ting chalter feater		(20) = 1 - (21) = (18)		19)] =			0.78	(20)
Infiltration rate incorpora Infiltration rate modified to	•		(21) = (10	/ X (20) =				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	1 3		1	1 -		l	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) == (2	2)m · 4	-			-	-		-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
(-24)	1 0.99	1 0.00	1 3.02		L	12	Lo	J	

Adjusted infiltr	ation rate (allowi	ng for sl	nelter ar	nd wind s	speed) =	(21a) x	(22a)m					
0.15	1 1	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effe		_	rate for t	he appli	icable ca	ise	-	-	-		-		
If exhaust air h			andiv N (2	3h) - (23:	a) × Fmv (aguation (I	NSN othe	rwisa (23h	n) = (23a)			0.5	(23
If balanced with									,) = (20a)			0.5	(23)
a) If balance			-	_					2h\m . (1	02h) v [1 (220)	76.5	(230
(24a)m= 0.27		0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	- 100] 	(24a
b) If balance				ļ	<u>l</u>	ļ	Į	Į	ļ ļ		0.20	J	
(24b)m= 0		0	0	0	0	0	0	0	0	0	0	1	(24)
c) If whole h	<u> </u>	ct ver				ventilatio	<u> </u>	nutsida Nutsida				J	•
,	n < 0.5 × (2			•	•				.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural	ventilation	or wh	ole hous	se positi	ve input	ventilati	on from	loft				,	
if (22b)r	n = 1, then	(24d)	m = (221)	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rat	te - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losse	s and heat	loss	paramet	er:									
ELEMENT	Gross area (m	1 ²)	Openin m	=	Net Ar A ,ı		U-val W/m2		A X U (W/ł	۲)	k-value kJ/m²·		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	_x 1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	_x 1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type	e 4				0.65	x1	/[1/(1.2)+	0.04] =	0.74				(27)
Walls Type1	38.14		20.5	8	17.56	5 X	0.15	= i	2.63				(29)
Walls Type2	23.92	1	2.6		21.32	2 X	0.15	<u> </u>	3.2	₹ i		= =	(29)
Walls Type3	5.95		0	一	5.95	x	0.15	₹ - i	0.89	=			(29)
Walls Type4	29.51		0		29.5	1 x	0.15	-	4.43	- i		7 F	(29)
Total area of e	elements, m	 1 ²			97.52	2							(31)
Party wall					12.35	5 x	0		0			$\neg \vdash$	(32)
Party floor					76.06	=							(32
Party ceiling					76.06	=						-	(32
* for windows and ** include the are					alue calcu		g formula 1	/[(1/U-valu	ue)+0.04] a	s given ir	n paragrapl	1 3.2	((32
Fabric heat los				,			(26)(30) + (32) =				37.84	(33
Heat capacity			•					((28).	(30) + (32	?) + (32a)	(32e) =	28062.4	
	,	,		_TFΔ\ iı	n k.l/m²K			Indica	itive Value:	Medium			(35
Thermal mass	parameter	(I IVII	2 = Cm -		1 10/111 1	•		maioa				250	[(33)
For design asses	sments where	the de	tails of the	,			recisely the				able 1f	250	(33)
	sments where ad of a detaile	the de	tails of the ulation.	construct	tion are no	t known pi	recisely the				able 1f	11	(36)

Total fabric he	0 0	are not kin	OWII (36) =	= 0.15 x (3	')								_
								(33) +	` '	,		48.84	(37)
Ventilation hea			i		l .			` ,	,	25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer of	coefficien	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		_
Heat loss para	meter (F	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	64.8	(39)
(40)m= 0.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84	0.84	0.85	0.86	0.86		
								,	Average =	Sum(40) ₁ .	12 /12=	0.85	(40)
Number of day	s in mor	nth (Tabl	le 1a)		·					1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting oper	av roqui	iroment:								kWh/ye	var:	
4. Water fiea	ing cher	igy requi	rement.								KVVII/ yC	,ai.	
Assumed occu											38		(42)
if TFA > 13.9		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9))2)] + 0.0	0013 x (ΓFA -13.	.9)			
if TFA £ 13.9	•	tor upoc	ao io litro	o nor de	\/d a	0.000	(OF v NI)	. 26					(40)
Annual average Reduce the annual									se target o		.82		(43)
not more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage is				,			,	ССР			200		
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
(11)=	00.27	02.00	00	00.01	00	00	00.01			m(44) ₁₁₂ =		1089.8	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	Tm / 3600					1000.0	` ′
(45)m= 148.15	129.57	133.7	440.57	444.05			-				143.47		
			116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
	<u> </u>	100.1	116.57	111.85	96.52	89.44	102.63					1428.9	(45)
If instantaneous w	ater heatir									132.12 m(45) ₁₁₂ =		1428.9	(45)
	vater heatin									M(45) ₁₁₂ =		1428.9	(45) (46)
(46)m= 22.22	19.44	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,	to (61)	Γotal = Su		=	1428.9	
(46)m= 22.22	19.44 loss:	ng at point 20.06	of use (no	hot water 16.78	storage),	enter 0 in 13.42	boxes (46 ₎ 15.39	to (61)	Γotal = Su 18.16	m(45) ₁₁₂ =	=	1428.9	
(46)m= 22.22 Water storage	19.44 loss: ne (litres)	ng at point 20.06 includin	f of use (no 17.48 ng any so	hot water 16.78 Dlar or W	storage), 14.48 /WHRS	enter 0 in 13.42 storage	boxes (46) 15.39 within sa	to (61)	Γotal = Su 18.16	m(45) ₁₁₂ =	21.52	1428.9	(46)
(46)m= 22.22 Water storage Storage volum	19.44 loss: ne (litres) neating a	ng at point 20.06 includin	f of use (no 17.48 ng any so ank in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	boxes (46, 15.39 within sa (47)	15.58 15.68	Total = Su 18.16 sel	m(45) ₁₁₂ =	21.52	1428.9	(46)
(46)m= 22.22 Water storage Storage volum If community h	19.44 loss: ne (litres) neating a	ng at point 20.06 includin	f of use (no 17.48 ng any so ank in dw	16.78 Dlar or W	storage), 14.48 /WHRS nter 110	enter 0 in 13.42 storage	boxes (46, 15.39 within sa (47)	15.58 15.68	Total = Su 18.16 sel	m(45) ₁₁₂ =	21.52	1428.9	(46)
(46)m= 22.22 Water storage Storage volum If community h	19.44 loss: ne (litres) neating a postored loss:	ng at point 20.06 includin nd no ta hot wate	17.48 17.48 ng any so nk in dw er (this in	o hot water 16.78 Dlar or W relling, e	r storage), 14.48 /WHRS nter 110 nstantar	enter 0 in 13.42 storage litres in neous co	boxes (46, 15.39 within sa (47)	15.58 15.68	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46)
(46)m= 22.22 Water storage Storage volum If community h Otherwise if no Water storage a) If manufact	19.44 loss: ne (litres) neating a o stored loss: curer's de	ng at point 20.06 includin and no ta hot wate	17.48 17.48 ang any so ank in dwer (this in oss factors)	o hot water 16.78 Dlar or W relling, e	r storage), 14.48 /WHRS nter 110 nstantar	enter 0 in 13.42 storage litres in neous co	boxes (46, 15.39 within sa (47)	15.58 15.68	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46) (47)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f	19.44 loss: ne (litres) neating a o stored l loss: curer's de	including at point 20.06 including and no tath hot water eclared to make the control of the cont	17.48 17.48 19 any so ank in dwer (this in oss factor 2b	o hot water 16.78 Dlar or W relling, e reludes i	r storage), 14.48 /WHRS nter 110 nstantar	enter 0 in 13.42 storage litres in neous co	boxes (46, 15.39 within sa (47)	15.58 15.58 nme ves:	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46) (47) (48)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f	19.44 loss: ne (litres) neating a costored loss: curer's defactor from mater	including at point 20.06 including and no tale hot water eclared lower Table storage	any so ank in dw er (this in oss facto 2b	o hot water 16.78 Dlar or W relling, e reludes i	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous co	boxes (46, 15.39 within sa (47) mbi boild	15.58 15.58 nme ves:	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46) (47) (48) (49)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water storage	19.44 loss: ne (litres) neating a o stored l loss: curer's de actor froi om water curer's de	including at point 20.06 including at hot water a clared to factor from the color and	ang any so ank in dw er (this in oss facto 2b e, kWh/ye	o hot water 16.78 Dlar or W relling, e icludes i or is kno	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous con/day):	boxes (46, 15.39 within sa (47) mbi boild	15.58 15.58 nme ves:	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46) (47) (48) (49)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stora	19.44 loss: ne (litres) neating a o stored l loss: curer's de actor froi om water curer's de age loss neating se	including at point 20.06 including and no tale hot water a storage eclared of factor from the eclared of the ec	ang any so ank in dw er (this in oss facto 2b e, kWh/ye	o hot water 16.78 Dlar or W relling, e icludes i or is kno	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous con/day):	boxes (46, 15.39 within sa (47) mbi boild	15.58 15.58 nme ves:	Total = Su 18.16 sel	m(45) ₁₁₂ = 19.82	21.52	1428.9	(46) (47) (48) (49) (50)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stora If community h	19.44 loss: ne (litres) neating a o stored l loss: curer's de actor from water curer's de age loss neating se from Tab	including at point 20.06 including at point and no tale at the eclared left at the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of	any so ank in dwer (this in oss factor by kWh/ye cylinder I com Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous con/day):	boxes (46, 15.39 within sa (47) mbi boild	15.58 15.58 nme ves:	Total = Su 18.16 sel	19.82 47)	21.52	1428.9	(46) (47) (48) (49) (50) (51)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water stora If community h	19.44 loss: ne (litres) neating a o stored l loss: curer's de actor from water curer's de age loss neating se from Tab	including at point 20.06 including at point and no tale at the eclared left at the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of factor from the eclared of	any so ank in dwer (this in oss factor by kWh/ye cylinder I com Tablon 4.3	o hot water 16.78 Dlar or W relling, e icludes i or is kno	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous con/day):	boxes (46, 15.39 within sa (47) mbi boild	15.58 15.58 nme ves:	Total = Su 18.16 sel	19.82 47)	21.52 0 0 0 0	1428.9	(46) (47) (48) (49) (50) (51)
Water storage Storage volum If community h Otherwise if no Water storage a) If manufact Temperature f Energy lost fro b) If manufact Hot water storage	19.44 loss: ne (litres) neating a o stored l loss: curer's de actor froi m water curer's de age loss neating se from Tab actor froi om water	including at point 20.06 including at point and no tale at the eclared left at the eclared of factor from the eclared of factor f	any so ank in dw er (this in oss facto 2b e, kWh/ye cylinder I from Tabl on 4.3	o hot water 16.78 Diar or W relling, e rellings i or is kno ear oss factor e 2 (kW)	r storage), 14.48 /WHRS nter 110 nstantar wn (kWh	enter 0 in 13.42 storage litres in neous co	boxes (46, 15.39 within sa (47) mbi boild	15.58 ame vessers) enter	18.16 sel	19.82 47)	21.52 0 0 0 0	1428.9	(46) (47) (48) (49) (50) (51)

Water storage loss calculated for each month $((56)m = (55) \times (41)m)$	
(56)m= 0 0 0 0 0 0 0 0 0 0 0	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix	ix H
(57)m= 0 0 0 0 0 0 0 0 0 0 0	(57)
Primary circuit loss (annual) from Table 3	(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m	
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	
(59)m= 0 0 0 0 0 0 0 0 0 0 0 0	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 50.91 44.31 47.2 43.89 43.5 40.31 41.65 43.5 43.89 47.2 47.47 50.91	(61)
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (62)m = 0.85 \times (45)m + (46)m + (57)m + (46)m + (57)m + (46)m + (57)m + (46)m + (57)m + (46)m + (57)m + (46)m + (57)m + (46)$	(59)m + (61)m
(62)m= 199.05 173.88 180.91 160.46 155.35 136.82 131.09 146.13 147.75 168.24 179.59 194.38	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	
(63)m= 0 0 0 0 0 0 0 0 0 0 0	(63)
Output from water heater	
(64)m= 199.05 173.88 180.91 160.46 155.35 136.82 131.09 146.13 147.75 168.24 179.59 194.38	
Output from water heater (annual) ₁₁₂	1973.65 (64)
Heat gains from water heating, kWh/month 0.25 $(0.85 \times (45))$ m + (61) m] + 0.8 $\times (46)$ m + (57) m + (59) m]
(65)m= 61.99 54.16 56.26 49.73 48.07 42.17 40.15 45 45.5 52.04 55.8 60.43	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community he	oating
	eaung
5. Internal gains (see Table 5 and 5a):	eating
5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5) Watts	eaung
Metabolic gains (Table 5), Watts	eaurig
Metabolic gains (Table 5), Watts	(66)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19	
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69) (70)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69) (70)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69) (70) (71)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 119.19	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

															<u>-</u>
Southwest _{0.9}	•	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwesto.	9x 0.77	X	5.5	51	X	9	2.85]		0.24	X	0.7	=	59.56	(79)
Southwesto.	0.77	x	0.6	S5	x	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwesto.	0.77	×	5.5	51	x	6	9.27]		0.24	X	0.7	_	44.43	(79)
Southwest _{0.9}	9x 0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9}	9x 0.77	X	5.5	51	x	4	14.07]		0.24	x	0.7		28.27	(79)
Southwesto.	9x 0.77	X	0.6	65	x	4	14.07]		0.24	x	0.7		3.34	(79)
Southwest _{0.9}	9x 0.77	X	5.5	51	x	3	31.49]		0.24	x [0.7		20.2	(79)
Southwest _{0.9}	9x 0.77	X	0.6	S5	x	3	31.49			0.24	x	0.7		2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m			_	
(83)m= 45.3	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts							_	
(84)m= 420.	22 455.76	489.61	527.34	553.86	54	42.21	515.23	483.	.82	449.62	416.98	400.59	402.07	<u>'</u>	(84)
7. Mean ir	ternal tem	perature	(heating	season)										
Temperati	ıre during l	neating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisation	factor for g	ains for l	living are	ea, h1,m	(se	ee Ta	ble 9a)								
Ja	n Feb	Mar	Apr	May	Ι,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	:	
(86)m= 1	1	0.99	0.97	0.9	С).72	0.54	0.5	59	0.86	0.98	1	1	7	(86)
Mean inte	rnal tempe	rature in	living ar	ea T1 (fo	ollo	w ste	ns 3 to 7	in T	able	e 9c)		•	•	_	
(87)m= 20.1		20.39	20.65	20.86		0.98	21	20.9		20.93	20.66	20.34	20.09	7	(87)
Temperati	ro during l	a coting p	oriodo i	root of	طيد	allina	from To	hla C		2 (°C)			<u> </u>	_	
(88)m= 20.1		20.2	20.21	20.21	_	0.22	20.22	20.2		20.22	20.21	20.21	20.2	٦	(88)
` '			l	L			L	<u> </u>	<u> </u>			1 -0			()
Utilisation			i	· · ·			i e	<u> </u>		0.0	0.07			\neg	(00)
(89)m= 1	1	0.99	0.96	0.86		0.64	0.45	0.5	!	0.8	0.97	1	1		(89)
	rnal tempe		i	1	-		i e	i 			e 9c)			_	
(90)m= 18.9	99 19.14	19.4	19.78	20.07	2	20.2	20.22	20.2	22	20.15	19.8	19.34	18.97		(90)
										f	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inte	rnal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2				_	
(92)m= 19.2	19.41	19.66	20	20.27	2	20.4	20.42	20.4	42	20.35	20.02	19.6	19.26		(92)
Apply adju	stment to t	he mean	interna	l temper	_		m Table	4e, 1	whe	re appro	priate	•		_	
(93)m= 19.1		19.51	19.85	20.12	2	0.25	20.27	20.2	27	20.2	19.87	19.45	19.11		(93)
8. Space h	·														
Set Ti to the the utilisat	ne mean in		•		ned	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=	(76)m an	d re-ca	lculate	
Ja		Mar	Apr	May		Jun	Jul	Ι Δ.	ug	Sep	Oct	Nov	Dec	. 7	
Utilisation			<u> </u>	Iviay	<u></u>	Juli	Jui		ug į	Оер	001	1 1404	Dec		
(94)m= 1	0.99	0.99	0.96	0.86	С	0.65	0.45	0.5	5	0.8	0.97	0.99	1	7	(94)
Useful gai		L	<u> </u>	L 4)m			ļ	<u> </u>					<u> </u>		
(95)m= 419.	ì	483.47	504.83	475.43	35	51.33	232.97	244.	.27	359.36	403.85	398.26	401.24		(95)
Monthly a	/erage exte	ernal tem	perature	from T	able	e 8		-				1		_	
(96)m= 4.3	3 4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	7	(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m]			- -	
(97)m= 981.	05 947.64	855.75	710.04	544.72	36	60.09	233.71	245.	.71	391.11	599.23	802.94	975.15	5	(97)
·														-	

Space heating require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 418.09 332.09	276.97	147.75	51.56	0	0	0	0	145.37	291.37	426.99		-
						Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	2090.19	(98)
Space heating require	ement in	kWh/m²	/year								27.48	(99)
8c. Space cooling red	quiremen	nt										
Calculated for June,												
Jan Feb Heat loss rate Lm (ca	Mar	Apr	May S°C inter	Jun nal temi	Jul	Aug	Sep	Oct	Nov e from T	Dec 10)		
$\frac{1000}{(100)} = 0 \qquad 0$	0	0	0	598.91	471.48	482.78	0	o 0	0	0		(100
Utilisation factor for lo		ŭ		000.01		.020	ŭ					`
101)m= 0 0	0	0	0	0.93	0.97	0.96	0	0	0	0		(101
Useful loss, hmLm (V	vatts) = ((100)m x	(101)m	!	!			ļ	ļ.			
102)m= 0 0	0	0	0	557.08	457.41	462.23	0	0	0	0		(102
Gains (solar gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)		•			
103)m= 0 0	0	0	0	713.8	680.73	645.01	0	0	0	0		(103
Space cooling require set (104)m to zero if				dwelling,	continu	ous (kW	h') = 0.0	24 x [(1(03)m – (102)m]> 	c (41)m	
104)m= 0 0	0	0	0	112.84	166.15	135.99	0	0	0	0		_
								= Sum(•	=	414.98	(104
Cooled fraction	abla 10h	١					f C =	cooled	area ÷ (4	4) = [0.59	(105
ntermittency factor (Table 106)m= 0 0	0	0	0	0.25	0.25	0.25	0	0	0	0		
0 0	l	ŭ		0.20	0.20	0.20		l = Sum(l	=	0	(106
Space cooling require	ment for	month =	(104)m	× (105)	× (106)r	m	70141	• • • • • • • • • • • • • • • • • • • •	100001/	l		
107)m= 0 0	0	0	0	16.5	24.3	19.89	0	0	0	0		
							Total	= Sum(107)	=	60.7	(107
Space cooling require	ment in k	:Wh/m²/y	/ear				(107)	÷ (4) =		Ī	0.8	(108
a. Energy requiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	HP)					
Space heating:												_
Fraction of space hea	at from so	econdar	y/supple	mentary	system						0	(201
Fraction of space hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202
Fraction of total heati	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204
Efficiency of main spa	ace heat	ing syste	em 1								89.5	(206
Efficiency of secondar	ry/suppl	ementar	y heating	g systen	າ, %						0	(208
Cooling System Ener	gy Efficie	ency Rat	tio							Ī	4.73	(209
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ :ar
Space heating require	ement (c			l			•	ı			•	
418.09 332.09	276.97	147.75	51.56	0	0	0	0	145.37	291.37	426.99		
(211) m = { (98) m x (20)4)] } x 1	00 ÷ (20	06)									(211
467.15 371.05	309.47	165.09	57.6	0	0	0	0	162.42	325.55	477.08		
<u> </u>						Tota	l (kWh/yea	ar) =Sum(2	211)	2=	2335.41	(211
Space heating fuel (s	econdar	y), kWh/	month							•		_
= {[(98)m x (201)] } x 1	00 ÷ (20	8)										
(215)m= 0 0	0	0	0	0	0	0	0	0	0	0		_
						Tota	I (kWh/yea	ar) = Sum(2)	215) _{15,1012}	<u>_</u>	0	(215

Output from water heater (calculated above)								
	36.82 13	1.09 146.	13 147.7	168.24	179.59	194.38		
Efficiency of water heater	•	•	•	•			89.5	(216
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5	9.5 89.	89.5	89.5	89.5	89.5		(217
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
• • • • • • • • • • • • • • • • • • • •	52.88 146	6.47 163.	28 165.08	187.98	200.66	217.18		
	•	•	otal = Sum	(219a) ₁₁₂ =	•	•	2205.19	(219
Space cooling fuel, kWh/month.						•		_
$ (221)m = (107)m \div (209) $ $ (221)m = $	3.49 5.	14 4.2	1 0	0	0	0		
			otal = Sum	(221) ₆₈ =		Į	12.85	(221
Annual totals				k	Wh/yea	r	kWh/year	_
Space heating fuel used, main system 1							2335.41	
Water heating fuel used							2205.19	
Space cooling fuel used							12.85	
Electricity for pumps, fans and electric keep-hot								
mechanical ventilation - balanced, extract or pos	sitive input	from out	side			162.85		(230
central heating pump:								
0 1 1						30		(230
Total electricity for the above, kWh/year		:	um of (230a	a)(230g) =	=	30	192.85	_
		:	um of (230a	a)(230g) =	=	30	192.85 332.22	(231
Total electricity for the above, kWh/year	ns includin		·	a)(230g) =	=	30		(230 (231 (232
Total electricity for the above, kWh/year Electricity for lighting	s including Energ kWh/y	g micro-C	·	Emiss	sion fac 2/kWh			(231
Total electricity for the above, kWh/year Electricity for lighting	Energ	g micro-C I y ear	·	Emiss	sion fac 2/kWh		332.22 Emissions	(231
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system	Energ kWh/y	g micro-C I y ear	·	Emiss kg CO	sion fac 2/kWh	etor	332.22 Emissions kg CO2/yea	(231) (232)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1)	Energ kWh/y	g micro-C	·	Emiss kg CO	sion fac 2/kWh	etor =	Emissions kg CO2/yea 504.45	(231) (232) (232) ar
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Energ kWh/y (211) x (215) x (219) x	g micro-C	HP	Emiss kg CO	sion fac 2/kWh	etor = =	332.22 Emissions kg CO2/yea 504.45	(231) (232) ar (261) (263)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Energ kWh/y (211) x (215) x (219) x	g micro-C	HP	Emiss kg CO	sion fac 2/kWh 116 119	etor = =	332.22 Emissions kg CO2/yea 504.45 0 476.32	(231) (232) (232) (261) (263) (264)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energ kWh/y (211) x (215) x (219) x (261) + (g micro-C	HP	Emiss kg CO	sion fac 2/kWh 116 119 116	etor	332.22 Emissions kg CO2/yea 504.45 0 476.32 980.77	(231) (232) ar (261) (263) (264) (265) (266)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling	Energ kWh/y (211) x (215) x (219) x (261) + ((221) x	g micro-C y ear (((262) + (263	HP	Emiss kg CO	sion fac 2/kWh 116 119 116	etor	332.22 Emissions kg CO2/yea 504.45 0 476.32 980.77 6.67	(231) (232) (232) (232) (261) (263) (266) (266) (267)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot	Energ kWh/y (211) x (215) x (219) x (261) + ((221) x (231) x	g micro-C y ear (((262) + (263	HP + (264) =	Emiss kg CO 0.2 0.5 0.5 0.5	sion fac 12/kWh 116 119 116	etor	332.22 Emissions kg CO2/yea 504.45 0 476.32 980.77 6.67 100.09	(231) (232) ar (261) (263) (264) (265)
Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot Electricity for lighting	Energ kWh/y (211) x (215) x (219) x (261) + ((221) x (231) x	g micro-C y ear (((262) + (263	HP + (264) =	Emiss kg CO 0.2 0.5 0.5 0.5 0.5	sion fac 12/kWh 116 119 116	etor	332.22 Emissions kg CO2/yea 504.45 0 476.32 980.77 6.67 100.09 172.42	(231) (232) Ar (261) (263) (264) (265) (266) (267) (268)

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	- 036 1-1	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	Flat 3-	1-Lean				
Address: 1. Overall dwelling dimer	noiono:								
1. Overall dwelling diffie	nsions.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) :	74.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
2. Vertilation rate.	main seconda heating heating	ry	other		total			m³ per hou	r
Number of chimneys		- + [0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 + 0		0	j = [0	x 2	20 =	0	(6b)
Number of intermittent far	ns			, <u> </u>	0	x ′	10 =	0	(7a)
Number of passive vents				Ē	0	x ′	10 =	0	(7b)
Number of flueless gas fir	res			F	0	X 4	40 =	0	(7c)
				_					
							Air ch	nanges per ho	our —
•	vs, flues and fans = $(6a)+(6b)+(6b)+(6b)$			continue fr	0		÷ (5) =	0	(8)
Number of storeys in th		id 10 (17),	ourer wise t	onunae n	om (<i>9)</i> to ((10)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	25 for steel or timber frame o			•	uction			0	(11)
if both types of wall are producting areas of opening	esent, use the value corresponding t gs); if equal user 0.35	o tne grea	ter wall are	a (atter					
•	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	·							0	(13)
Window infiltration	and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	nvelope	area	3	(17)
•	ty value, then $(18) = [(17) \div 20] +$							0.15	(18)
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed	ĺ	_	740
Number of sides sheltered Shelter factor	u		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorporati	ing shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind speed						l		
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7							1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate	(allowi	ng for sh	ielter an	d wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec		-	rate for t	he appli	cable ca	se		!			•	-	
If mechanica			andiv N. (2	2h) _ (22a) Em. (auation (VEVV otho	muino (22h) - (220)			0.5	(23a)
If balanced with		0		, ,	,	. `	,, .	,) = (23a)			0.5	(23b)
		•	•	J		,		,	2l-\ /	005) [4 (00-)	76.5	(23c)
a) If balance (24a)m= 0.28	o mechan	0.27	0.26	0.25	0.24	0.24	HR) (248 0.24	0.24	2b)m + (0.25	23D) × [0.26	$\frac{1 - (230)}{0.27}$) ÷ 100]]	(24a)
` '	<u> </u>				<u> </u>	<u> </u>	Į	ļ	<u>l</u>	<u>Į</u>	0.21	J	(240)
b) If balance (24b)m= 0	o mechan	0	0	0 WILLIOUT	0	overy (i	0 0	0	0	230)	0	1	(24b)
					<u> </u>	<u> </u>]	(245)
c) If whole h	ouse extra n < 0.5 × (•	•				5 × (23h	o)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0	1	(24c)
d) If natural	ventilation	or wh	ole hous	e positiv	Le input	L ventilatio	on from	l	<u> </u>	<u>!</u>	ļ.	J	
,	n = 1, then			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change ra	ate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in bo	x (25)	-	-	-	_	
(25)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(25)
3. Heat losse	s and hea	t loss r	naramete	ar.								_	
ELEMENT	Gross area (r	İ	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	arca (i	'' <i>)</i>	•		2.6	x	1.2	.i. 	3.12		10/111	IX.	(26)
Windows Type	ւ 1				3.26		/[1/(1.2)+		3.73	=			(27)
Windows Type						〓 .	/[1/(1.2)+			\dashv			(27)
Windows Type					3.95	_	/[1/(1.2)+ /[1/(1.2)+		4.52	=			
• •					5.51	_			6.31	=			(27)
Windows Type		_			0.65	=	/[1/(1.2)+	—, ¦	0.74	亅 ,			(27)
Walls Type1	67.78		20.58	3	47.2	X	0.15	= !	7.08	닠 !		┥ ┝	(29)
Walls Type2	24.47		2.6	_	21.87	7 X	0.15	= !	3.28	_		ᆜ └	(29)
Walls Type3	5.93		0		5.93	X	0.15	=	0.89			ᆜ	(29)
Roof	19.72		0		19.72	2 X	0.15	=	2.96				(30)
Total area of e	lements, r	m²			117.9)							(31)
Party wall					12.38	3 x	0	=	0				(32)
Party floor					74.06	3							(32a
Party ceiling					54.34	1				[(32b
* for windows and ** include the area						ated using	g formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	n paragrapi	h 3.2	
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30) + (32) =				40.89	9 (33)
Heat capacity	Cm = S(A	xk)						((28).	(30) + (32	2) + (32a).	(32e) =	26033.	88 (34)
Thermal mass	paramete	er (TMF	P = Cm ÷	· TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used inste				construct	ion are no	t known pi	recisely the	e indicative	values of	TMP in T	able 1f		
Thermal bridge				ısing Ap	pendix l	<						22.8	1 (36)
3	`	•		5 1									(/

Heat transfer coefficient, W/K (39)m= 81.5 81.3 81.1 80.08 79.88 78.87 78.87 78.87 79.27 79.88 80.29 80.69 Average = Sum(39), /12= 80.03 (39) Heat loss parameter (HLP), W/m²K (40)m= 1.1 1.1 1.1 1.08 1.08 1.08 1.06 1.06 1.06 1.07 1.08 1.08 1.09 Average = Sum(40), /12= 1.08 (40) Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (41)m= 31 28 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 (41) 4. Water heating energy requirement: **Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 80.79 Reduce the annual average hot water usage in litres per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (43) Reduce the annual average hot water usage in litres per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (43) Reduce the annual average hot water usage in litres per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (43) Reduce the annual average hot water usage in litres per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44)	if details of ti	hermal bridgir	ng are not kr	nown (36) :	= 0.15 x (3	1)								
Sulphe									(33) +	(36) =			63.71	(37)
(38) (17.8 17.8 17.38 16.38 16.18 16.16 15.16 14.96 15.57 16.18 16.58 16.99 (38)	Ventilation	heat loss	calculated	d monthl	у		1		· · ·	= 0.33 × ((25)m x (5)		Ī	
Heat transfer coefficient, W/K (39)m= (37) + (38)m Average = Sum(39) - (17) = (80)m Average = Sum(39) - (17) = (80)m Average = Sum(39) - (17) = (80)m Average = Sum(39) - (17) = (80)m Average = Sum(39) - (17) = (80)m Average = Sum(39) - (17) = (80)m Average = Sum(40) - (17) = (10)	J	an Feb) Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Same St.	(38)m= 1	7.8 17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Average Sum(39) 1/2 80.03 (39)	Heat trans	sfer coeffici	ent, W/K				_		(39)m	= (37) + (38)m			
Heat loss parameter (HLP), W/m²K (40)m= 1.1	(39)m= 8	1.5 81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		
(40)ms			<i></i> = \									12 /12=	80.03	(39)
Average Sum(40) a/12 1.08 (40)	_	` 	``	1					·		<u> </u>		İ	
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 1	.1 1.1	1.1	1.08	1.08	1.06	1.06	1.06	<u> </u>					7(40)
(41)me 31 28 31 30 31 30 31 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 4(2) If TRA > 13.9, N = 1 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) 2.34 (42) (43) (42) (43) (43) (43) (43) (43) (43) (Number o	f days in m	onth (Tab	ole 1a)	-	_		-		Average =	Sum(40) ₁	12 /12=	1.08	(40)
### Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA \$ 13.9, N = 1 Annual average hot water usage in litres per day Vd_average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd_m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44) = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd_m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 Total = Sum(44) = 1412.71 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): G (48) Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 0 (50) (51) If community heating see section 4.3 Volume factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (52) Temperature factor from Table 2b G (53) Energy lost from water storage, kWh/year	J	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	(41)m=	31 28	31	30	31	30	31	31	30	31	30	31		(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)		•	•										•	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd.average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per per olay (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 98.77 95.17 91.58 87.99 84.4 80.81 80.81 80.81 84.4 87.99 91.58 95.17 98.77 Total = Sum(44) = 1077.45 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m × nm × DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 146.47 128.1 132.19 115.25 110.58 95.42 88.42 101.47 102.68 119.66 130.62 141.85 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 21.97 19.22 19.83 17.29 16.59 14.31 13.26 15.22 15.4 17.95 19.59 21.28 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)	4. Water	heating en	ergy requ	irement:								kWh/ye	ear:	
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Note Note												.79		(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec						_	_	to achieve	a water us	se target o	†			
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Total = Sum(44)			,					· <i>′</i>	07.00	04.50	05.47	00.77		
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)111= 96	95.17	91.56	67.99	04.4	00.01	00.01	04.4	l			l	1077.45	(44)
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Temperature factor from Table 2b $0 \qquad (53)$ Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 0 \qquad (54)$				on 4.3									1	
Energy lost from water storage, kWh/year $ (47) \times (51) \times (52) \times (53) = 0 $ (54)				2h							-			
	·							(47) (51)	(FC) (50)]	, ,
			_	e, KVVN/y	ear			(41) X (51)) X (52) X (os) =	—			
	EINEI (30	<i>,</i> 01 (0 4 <i>)</i> 111	(00)									U	1	(33)

Water stor	age loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder co	ntains dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary cir	rcuit loss (ar	nnual) fro	om Table	3							0		(58)
Primary ci	rcuit loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modifie	d by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	s calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50	.33 43.81	46.67	43.39	43.01	39.85	41.18	43.01	43.39	46.67	46.94	50.33		(61)
Total heat	required for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		(62)
Solar DHW ir	nput calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additi	ional lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	m water hea	iter	-		-	-	-		-	-	-		
(64)m= 19	6.8 171.91	178.86	158.64	153.59	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
	•	•	•		•		Outp	out from w	ater heate	r (annual) ₁	12	1951.28	(64)
Heat gains	s from water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m= 61	.28 53.55	55.62	49.17	47.52	41.69	39.7	44.49	44.99	51.46	55.17	59.75		(65)
			1	_	1	1 00.7	44.43	44.55	31.40	33.17	39.73		(00)
include (culation (u of (65)m		<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	l eating	(00)
	` ,			only if c	<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	eating	(00)
5. Interna	al gains (see	e Table 5	and 5a	only if c	<u> </u>	<u> </u>	ļ		ļ	ļ	ļ	eating	(66)
5. Interna	` ,	e Table 5	and 5a	only if c	<u> </u>	<u> </u>	dwelling	or hot w	ļ	ļ	munity h	eating	(55)
5. International Metabolic	al gains (see	E Table 5	and 5a	only if c	ylinder i	s in the o	ļ		ater is fr	om com	ļ	eating	(66)
5. International Metabolic (66)m= 117	gains (Table an Feb 7.03 117.03	E Table 5 E 5), Wat Mar 117.03	ts Apr 117.03	only if constant of the consta	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. International Metabolic Metabolic (66)m= 117 Lighting ga	al gains (see gains (Table an Feb	E Table 5 E 5), Wat Mar 117.03	ts Apr 117.03	only if constant of the consta	Jun	Jul 117.03	Aug 117.03	Sep	ater is fr	om com	munity h	eating	
5. International Metabolic (66)m= 117 Lighting games (67)m= 18	gains (Table gains (Table an Feb 7.03 117.03 ains (calcula	E Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3	ts Apr 117.03 ppendix 10.07	May 117.03 L, equat	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	Nov	Dec	eating	(66)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances	gains (Table an Feb 7.03 117.03 ains (calcula 16.36 s gains (calcula	Mar 117.03 ted in Ap 13.3	ts Apr 117.03 Dependix 10.07 Append	May 117.03 L, equat 7.53 dix L, eq	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206	gains (Table an Feb 7.03 117.03 eins (calcula 42 16.36 s gains (calcula 5.58 208.73	Mar 117.03 ted in Ap 13.3 culated ir 203.32	ts	May 117.03 L, equat 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
5. International Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga	gains (Table an Feb 7.03 117.03 ains (calcula 16.36 s gains (calcula	Mar 117.03 ted in Ap 13.3 culated ir 203.32	ts	May 117.03 L, equat 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 see Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
5. International Metabolic (66)m=	al gains (see gains (Table an Feb 7.03 117.03 ains (calcula see gains	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and	gains (Table an Feb 7.03 117.03 ains (calcula 42 16.36 s gains (calcula 5.58 208.73 ains (calcula	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7	ts Apr 117.03 ppendix 10.07 Append 191.82 ppendix 34.7	May 117.03 L, equat 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 32 Pumps and (70)m= 33	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 6.58 208.73 ains (calcula 4.7 34.7 d fans gains 3 3	Mar 117.03 ted in Ap 13.3 culated ir 203.32 ated in A 34.7 (Table \$	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.ga	gains (Table gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula 5.58 208.73 ains (calcula 4.7 34.7 d fans gains	Mar 117.03 ted in Ap 13.3 culated ir 203.32 ated in A 34.7 (Table \$	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. Internal Metabolic (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g. (71)m= -93	gains (Table an Feb 7.03 117.03 ains (calcula .42 16.36 s gains (calcula 5.58 208.73 ains (calcula 1.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5	ts Apr 117.03 Appendix 10.07 Appendix 191.82 Appendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
Metabolic Metabolic Ji (66)m= 117 Lighting ga (67)m= 18 Appliances (68)m= 206 Cooking ga (69)m= 34 Pumps and (70)m= 34 Losses e.g (71)m= -93 Water hea	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio	Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5	ts Apr 117.03 Appendix 10.07 Appendix 191.82 Appendix 34.7 5a) 3 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4 , also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
5. International Metabolic (66)m=	gains (See gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62 ting gains (7	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negation of the second of the seco	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)
5. International Metabolic (66)m= 117 Lighting gate (67)m= 18 Appliances (68)m= 206 Cooking gate (69)m= 32 Pumps and (70)m= 32 Losses e.g. (71)m= -93 Water head (72)m= 82 Total international Metabolic (72)m= 82	al gains (see gains (Table an Feb 7.03 117.03 ains (calcula 4.2 16.36 s gains (calcula 4.7 34.7 d fans gains 3 3 g. evaporatio 3.62 -93.62 ting gains (7.37 79.68	e Table 5 e 5), Wat Mar 117.03 ted in Ap 13.3 culated in 203.32 ated in A 34.7 (Table 5 3 on (negation of the second of the seco	ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 3 tive valu -93.62	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7 3 ble 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 see Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 3 -93.62	Nov 117.03 17.76 183.82 34.7 3	Dec 117.03 18.93 197.47 34.7 3	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

	_		<u>_</u>														_
Southwe	est _{0.9x}	0.77	X	0.6	S5	X	1	04.39			0.24	x	0.7		=	7.9	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	X	9	92.85			0.24	X	0.7		=	59.56	(79)
Southwe	est _{0.9x}	0.77	X	0.6	35	x	9	92.85			0.24	X	0.7		=	7.03	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	6	9.27			0.24	X	0.7		=	44.43	(79)
Southwe	est _{0.9x}	0.77	X	0.6	S5	x	6	9.27] [0.24	x	0.7		=	5.24	(79)
Southwe	est _{0.9x}	0.77	X	5.5	51	x	4	14.07] [0.24	x	0.7		=	28.27	(79)
Southwe	est _{0.9x}	0.77	x	0.6	35	x	4	14.07			0.24	x	0.7		=	3.34	(79)
Southwe	est _{0.9x}	0.77	x	5.5	51	x	3	31.49			0.24	x	0.7		=	20.2	(79)
Southwe	est _{0.9x}	0.77	X	0.6	35	x	3	31.49	[0.24	x	0.7		=	2.38	(79)
			<u></u>														_
Solar g	ains in	watts, ca	alculated	for eacl	h month				(83)m	= St	um(74)m .	(82)m				_	
(83)m=	45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	79	151.24	96.8	55.44	38.0	5		(83)
Total g	ains – i	nternal a	nd solar	(84)m =	= (73)m ·	+ (8	33)m	, watts					_				
(84)m=	413.81	449.38	483.46	521.58	548.52	53	37.26	510.51	479.	03	444.62	411.58	394.75	395.8	36		(84)
7. Me	an inter	nal temp	erature	(heating	season)											
Temp	erature	during h	eating p	eriods ir	n the livii	ng :	area	from Tab	ole 9,	Th	1 (°C)					21	(85)
Utilisa	ition fac	tor for g	ains for I	iving are	ea, h1,m	(s	ee Ta	ıble 9a)			` '						
	Jan	Feb	Mar	Apr	May	È	Jun	Jul	Αι	ıg	Sep	Oct	Nov	De	C		
(86)m=	1	1	0.99	0.98	0.94	(0.82	0.65	0.7	1	0.91	0.99	1	1			(86)
ı Mean	interna	l temner	ature in I	living ar	a T1 (fo	مالد	w sta	ns 3 to 7	in T	ahle	9c)						
(87)m=	19.79	19.9	20.11	20.41	20.71	_	0.91	20.98	20.9		20.82	20.45	20.07	19.7	7		(87)
		l	l l		l			<u> </u>	<u> </u>								` ,
·r	erature 20	auring n	eating p	erioas ir 20.02	20.02	_	eiiing :0.03	20.03	20.0	_	20.03	20.02	20.01	20.0	4	I	(88)
(88)m=	20	20	20	20.02	20.02		.0.03	20.03	20.0)3	20.03	20.02	20.01	20.0	1		(00)
r	ition fac	tor for g	ains for r			_	<u> </u>	1	9a)							•	
(89)m=	1	1	0.99	0.97	0.91	(0.73	0.52	0.5	8	0.86	0.98	1	1			(89)
Mean	interna	l temper	ature in t	the rest	of dwelli	ng	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)					
(90)m=	18.38	18.54	18.85	19.3	19.71	1	9.97	20.02	20.0)2	19.86	19.36	18.8	18.3	6		(90)
											f	LA = Livii	ng area ÷ (4) =		0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llin	g) = fl	LA × T1	+ (1 -	– fL	A) × T2						_
(92)m=	18.75	18.9	19.18	19.59	19.97	_	0.21	20.27	20.2		20.11	19.65	19.14	18.7	3		(92)
ا Apply	adjustr	nent to t	he mean	internal	l temper	<u> </u>	re fro	m Table	4e, v	whe	re appro	priate	1	!		•	
(93)m=	18.6	18.75	19.03	19.44	19.82	2	0.06	20.12	20.1	12	19.96	19.5	18.99	18.5	8		(93)
8. Spa	ace hea	ting requ	uirement														
						ed	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	(76)m an	d re-c	alc	culate	
the uti		i e	or gains u		I	_		1						ı		Ī	
[Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	De	C		
r			ains, hm				. 7.4		0.5		0.00	0.00	1			1	(04)
(94)m=	1	0.99	0.99	0.97	0.9	(0.74	0.53	0.5	9	0.86	0.98	0.99	1			(94)
(95)m=	412.59	447.13	W = (94 478.19	505.1	4)III 495.01	20	96.15	272.85	283.	00	382.4	401.65	392.53	394.9	73	l	(95)
			rnal tem		l .	L		212.00	203.	90	JUZ.4	401.03	J32.33] 394.8	<i>,</i>		(55)
(96)m=	4.3	4.9	6.5	8.9	11.7	_	e o 14.6	16.6	16.4	₄ T	14.1	10.6	7.1	4.2			(96)
			an intern		L			Į	<u> </u>				ļ ,			1	V = 1
r			1016.19		648.59		30.98	277.85	292.	_ т	464.92	710.87	954.37	1160.	.08		(97)
(- /													1			I	. ,

	9.94 456.0	1 400.27	244.1	114.26	0	0	0	0	230.06	404.52	569.27		
	•	•	•	!			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2978.42	(98
Space he	ating requ	irement ir	n kWh/m ²	²/year							Ī	40.22	(99
Bc. Space	e cooling	equireme	nt								L		
	Ĭ	, July and		See Tal	ole 10b								
Ja	an Fe	o Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss	rate Lm (calculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
00)m= 0		0	0	0	741.37	583.63	597.87	0	0	0	0		(10
	factor fo		1	1							i		
01)m= 0		0	0 (122)	(121)	0.82	0.9	0.87	0	0	0	0		(1)
		(Watts) =	ì	<u> </u>			540.04						(1)
,	0 lor going	0	o l for oppli	0	608.97	523.03	519.34	0	0	0	0		(1)
	o la gains	calculated 0		0	706.39	673.64	637.8	0	0	0	0		(1
		irement fo			l	l						r (11)m	(.
		if (104)m •			iweiiiig,	COMMINU	JUS (KVV	11) = 0.0	24 X [(10)3)III — (102)111] X	. (4 1)III	
04)m= 0		0	0	0	70.15	112.05	88.13	0	0	0	0		
	<u>.</u>				ļ.	!		Total	= Sum(104)	=	270.33	(1
ooled frac	ction							f C =	cooled	area ÷ (4	4) =	0.6	(1
	-	Table 10b	í – –				i		·				
06)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
	P			(404)	(405)	(400)		Tota	I = Sum(104)	= [0	(1
	ing requi	rement for	montn =	(104)m	x (105)	× (106)r	n 13.24	0	0	0	0		
	, •		1 "		10.54	10.03	13.24	0	'	0	1 ° 1		
							•	Total	_ Sum/	107)		40.61	7/1
	lina roqui	romant in	14\A/b/m2/s	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					= Sum(1,0,7)	=	40.61	= '
		rement in	· ·				·	(107)	l = Sum() ÷ (4) =	107)	= [40.61 0.55	= '
ı. Energy	requiren	rement in ents – Inc	· ·		ystems i	ncluding	micro-C	(107)	`	1,0,7)	= [= '
. Energy Space he	requirent	ents – Inc	lividual h	eating s				(107)	`	107)	= [0.55	(1
Energy Fpace here Fraction of	requirements eating: of space h	ents – Inc	dividual h	eating sy				(107 <u>)</u> :HP)	`	1,0,7)	= [0.55	(1
Energy Space here Fraction of	requirements eating: of space has been spaced by the space has been spaced by the space has been spaced by the space has been spaced by the space has been spaced by the space has been spaced by the space has been spaced by the spac	ents – Inc eat from s eat from r	dividual h	eating sy y/supple tem(s)		system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	1,0,7)	= [0.55 0 1	(1)
a. Energy Space he Fraction of Fraction of	requirements eating: of space hof space hof total he	eat from seat from reat from reating from	dividual h secondar main syst main sys	eating sy y/supple tem(s) stem 1		system		(107) CHP) - (201) =) ÷ (4) =	1,0,7)	= [0.55 0 1	(1)
Energy Space here Fraction contraction c	requirementating: of space has been space for total here of main space space for total here	eat from seat from reating from space hea	dividual hasecondar main systemain s	eating syy/supple tem(s) stem 1	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	1,0,7)	= [0.55 0 1	(2)
A. Energy Space here Fraction of Fraction of Fraction of Efficiency	requirementating: of space has been space for total here of main space space for total here	eat from seat from reat from reating from	dividual hasecondar main systemain s	eating syy/supple tem(s) stem 1	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	1,0,7)	= [0.55 0 1	(2) (2) (2) (2)
Energy Space he Fraction of Fraction of Fraction of Efficiency Efficiency	requiremental repairs of space had total here of main second	eat from seat from reating from space hea	dividual hasecondar main systemain s	eating syysupple tem(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	1,0,7)	= [0 0 1 1 89.5	(1) (2) (2) (2) (2) (2)
Energy Space here Fraction of Fraction of Efficiency Efficiency Cooling S	requiremental repairs of space had total here of main second	eat from seat from rating from space headary/suppergy Efficie	dividual hasecondar main systemain s	eating syysupple tem(s) stem 1 em 1 y heating	mentary	system	(202) = 1 -	(107) CHP) - (201) =) ÷ (4) =	1,0,7) Nov	= [[[[Dec	0 1 1 89.5	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Energy Space here Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction of Fraction	requirements pating: of space h of total he of main s of secon system Er an Fe	eat from seat from rating from space headary/suppergy Efficie	secondar main systemating systementar iency Ra	eating syysupple tem(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 - (204) = (2 ¹)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] =			0.55 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Energy Space here Fraction of Fraction of Efficiency Cooling S	requirements eating: of space hof space hof total her of main so of secon system Er an Fe ating requirements	eat from seat from rating from space headary/suppergy Efficient	secondar main systemating systementar iency Ra	eating syysupple tem(s) stem 1 em 1 y heating tio	mentary g system Jun	system	(202) = 1 - (204) = (2 ¹)	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] =			0.55 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2)
Efficiency Cooling S Space he Space he Space he Space he Space he Space he	requirements reating: of space h of space h of total he of main s of secon system Er an Fe ating requirements	eat from seat from reating from space heardary/suppergy Efficition Maruirement (secondar main systemating systementar iency Ra Apr calculate	eating sylvapple tem(s) stem 1 y heating tio May d above 114.26	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (2) Aug	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	[[[Dec	0.55 0 1 1 89.5 0 4.73	(1 (1 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Fraction of Fracti	requirements eating: of space hold total her of secon system Er an Fe ating requirements 0.94 456.0 [(98)m x (eat from seat from rating from space hear dary/suppergy Efficient Martinement (day 1,000.27, 204)] } x	secondar main systemating systementar iency Ra Apr calculate	eating sylvapple tem(s) stem 1 y heating tio May d above 114.26	mentary g system Jun	system n, % Jul	(202) = 1 - (204) = (2) Aug	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct	Nov	[[[Dec	0.55 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Fraction of Fracti	requirements eating: of space hold total her of secon system Er an Fe ating requirements 0.94 456.0 [(98)m x (eat from seat from rating from space hear dary/suppergy Efficient Martinement (day 1,000.27, 204)] } x	secondar main systematic systemat	eating system (s) stem 1 em 1 y heating tio May d above; 114.26	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 230.06	Nov 404.52	Dec 569.27	0.55 0 1 1 89.5 0 4.73	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Fraction of Fracti	requirements of space has been space	eat from seat from rating from space hear dary/suppergy Efficient Martinement (day 1,000.27, 204)] } x	secondar main systemating systementar iency Ra Apr calculate 244.1 100 ÷ (20 272.74	eating syysupplements) stem 1 em 1 y heating tio May d above 114.26 06) 127.66	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 230.06	Nov 404.52	Dec 569.27	0 1 1 89.5 0 4.73 kWh/ye	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Fraction of Fracti	requirements of space has been space	eat from seat from rating from space hear dary/suppergy Efficient (and the space) Mar (and the space) Advisorement (and the space) A	secondar main systemain systementar iency Ra Apr calculate 244.1 100 ÷ (20 272.74	eating syysupplements) stem 1 em 1 y heating tio May d above 114.26 06) 127.66	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	(107) CHP) - (201) = 02) × [1 -) ÷ (4) = (203)] = Oct 230.06	Nov 404.52	Dec 569.27	0 1 1 89.5 0 4.73 kWh/ye	(1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2

Culpul Holli Walei Healei (Calculaleu above)									
Output from water heater (calculated above) 196.8 171.91 178.86 158.64 153.59 1	135.27	129.6	144.48	146.07	166.33	177.56	192.18		
Efficiency of water heater								89.5	(216
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(217
Fuel for water heating, kWh/month									
(219) m = (64) m x $100 \div (217)$ m (219)m = 219.89 192.08 199.84 177.25 171.61 1	151.14	144.81	161.43	163.21	185.85	198.39	214.72		
			Tota	I = Sum(2	19a) ₁₁₂ =	<u>I</u>	!	2180.21	(219
Space cooling fuel, kWh/month.							•		_
$(221)m = (107)m \div (209)$ $(221)m = 0 $	2.23	3.56	2.8	0	0	0	0		
	1		Tota	l = Sum(2:	21) ₆₈ =	<u> </u>		8.59	(221
Annual totals					k'	Wh/yeaı	ŗ	kWh/year	_
Space heating fuel used, main system 1								3327.84	
Water heating fuel used								2180.21]
Space cooling fuel used								8.59	
Electricity for pumps, fans and electric keep-hot									
mechanical ventilation - balanced, extract or pos	sitive in	put fron	n outside	Э			158.57		(230
central heating pump:							30		(230
Total electricity for the above, kWh/year									(===
			sum	of (230a).	(230g) =			188.57	(231
Electricity for lighting			sum	of (230a).	(230g) =			188.57 325.25	_
Electricity for lighting 12a. CO2 emissions – Individual heating system	ns inclu	ding mi			(230g) =		[(231
, , ,	Ene	ding mi ergy h/year				ion fac	tor		(231
, , ,	Ene	ergy h/year			Emiss	ion fac 2/kWh	tor = [325.25 Emissions	(231
12a. CO2 emissions – Individual heating system	Ene kW	ergy h/year) ×			Emiss kg CO	ion fac 2/kWh		325.25 Emissions kg CO2/yea	(231) (232)
12a. CO2 emissions – Individual heating system Space heating (main system 1)	Ene kW (211	ergy h/year) ×			Emiss kg CO	ion fac 2/kWh 16	= [325.25 Emissions kg CO2/yea	(231) (232) (232) ar
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Ene kW (211 (215 (219	ergy h/year) ×) ×			Emiss kg CO	ion fac 2/kWh 16	= [325.25 Emissions kg CO2/yea 718.81	(231) (232) (232) (261) (263) (264)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kW (211 (215 (219	ergy h/year) x) x) x	cro-CHP		Emiss kg CO	ion fac 2/kWh 16 19	= [325.25 Emissions kg CO2/yea 718.81 0 470.92	(231) (232) ar (261) (263)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Ene kW (211 (215 (219 (261	ergy h/year) x) x) x) + (262)	cro-CHP		Emiss kg CO: 0.2 0.5 0.2	ion fac 2/kWh 16 19	= [= [= [325.25 Emissions kg CO2/yea 718.81 0 470.92 1189.74	(231) (232) ar (261) (263) (264) (265) (266)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling	Ene kW (211 (215 (219 (261 (221	ergy h/year) x) x) x) + (262) -	cro-CHP		Emiss kg CO 0.2 0.5 0.5	ion fac 2/kWh 16 19 16	= [= [= [325.25 Emissions kg CO2/yea 718.81 0 470.92 1189.74 4.46	(231) (232) ar (261) (263) (264) (265) (266) (266)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot Electricity for lighting	Ene kW (211 (215 (219 (261 (221 (231	ergy h/year) x) x) x) + (262) -	cro-CHP	(264) =	Emiss kg CO 0.2 0.5 0.5 0.5	ion fac 2/kWh 16 19 16	= [= [= [= [325.25 Emissions kg CO2/yea 718.81 0 470.92 1189.74 4.46 97.87	(231) (232) Ar (261) (263) (264) (265) (266) (267) (268)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot	Ene kW (211 (215 (219 (261 (221 (231	ergy h/year) x) x) x) + (262) -	cro-CHP	(264) = sum o	Emiss kg CO. 0.2 0.5 0.5 0.5 0.5	ion fac 2/kWh 16 19 16	= [= [= [= [325.25 Emissions kg CO2/yea 718.81 0 470.92 1189.74 4.46 97.87 168.8	(231) (232) ar (261) (263) (264) (265)

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	roperty	Address	Flat 3-2	2-Lean				
Address: 1. Overall dwelling dime	oneione:								
1. Overall dwelling diffie	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) ====	76.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = [0	x	20 =	0	(6b)
Number of intermittent fa	ins				0	x -	10 =	0	(7a)
Number of passive vents	3			Ē	0	x -	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_					
		_	- \	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		.a to (),			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wall are	a (aitei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h					area	3	(17)
,	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•		•		0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			<u></u>
Number of sides sheltere Shelter factor	ed		(20) = 1 -	in n 75 v (1	10)1 –			3	(19)
Infiltration rate incorporate	ting shelter factor		(20) = 13 (21) = (18)		19)] =			0.78	(20)
Infiltration rate modified f	•		(=1) (10	, n (=0)				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp						1			
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 1								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
	1 1 35 1 5.00		1			<u> </u>		J	

Adjusted infilt	ration rate	(allowi	ng for sh	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effe		•	rate for t	he appli	cable ca	se	•	•	•	•	•		
If mechanic			andiv N. /O	2h) _ (22c	a) + Emy (a	auation (VEVV otho	muiaa (22h) - (22a)			0.5	(23a)
If balanced wit) = (23a)			0.5	(23b)
		-	-	_					2h\m . /	00h) [/	(00.0)	76.5	(23c)
a) If balance (24a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	÷ 100]	(24a)
b) If balance	<u> </u>					<u> </u>			ļ	<u> </u>	0.20		(/
(24b)m= 0		0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h	<u> </u>	act ver	tilation o	r positiv	re input v		on from o		.5 × (23b	<u> </u>	1		, ,
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)	ventilatior m = 1, the			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	r change ra	ate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)	-				
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losse	es and hea	at loss r	paramete	er:									
ELEMENT	Gross area (6	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	≺)	k-value kJ/m²-l		A X k kJ/K
Doors													
					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	╡,	1.2 /[1/(1.2)+		3.12				(26) (27)
Windows Type						x1		0.04] =					, ,
	e 2				3.26	x1 x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Typ	e 2 e 3				3.26	x1 x1 x1	/[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.73 4.52				(27) (27)
Windows Type	e 2 e 3		20.56	В	3.26 3.95 5.51	x1 x1 x1 x1	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	3.73 4.52 6.31			-	(27) (27) (27)
Windows Type Windows Type Windows Type	e 2 e 3 e 4	_	20.56	3	3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1 x1	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	3.73 4.52 6.31 0.74				(27) (27) (27) (27)
Windows Type Windows Type Windows Type Walls Type1	e 2 e 3 e 4	_		3	3.26 3.95 5.51 0.65 17.56	x1 x1 x1 x1 x1 x2 x x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63				(27) (27) (27) (27) (29)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2	e 2 e 3 e 4 38.14 23.92		2.6	8	3.26 3.95 5.51 0.65 17.56	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2				(27) (27) (27) (27) (29) (29)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3	e 2 e 3 e 4 38.14 23.92 5.95		2.6	8	3.26 3.95 5.51 0.65 17.56 21.32 5.95	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89				(27) (27) (27) (27) (29) (29) (29) (29)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45		2.6 0	8	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				(27) (27) (27) (27) (29) (29) (29)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of 6	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45		2.6 0	8	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07				(27) (27) (27) (29) (29) (29) (29) (29) (30) (31)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45		2.6 0	8	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				(27) (27) (27) (27) (29) (29) (29) (29) (30) (31)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of e	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45		2.6 0	B	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45 117.9 12.35	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07				(27) (27) (27) (27) (29) (29) (29) (29) (30) (31) (32)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of e Party wall Party floor	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45 elements,	m²	2.6 0 0 0	indow U-va	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04]	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07	I I I I I I I I I I I I I I I I I I I	paragraph		(27) (27) (27) (29) (29) (29) (29) (30) (31) (32)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of e Party wall Party floor Party ceiling * for windows and	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45 elements,	m² ws, use e	2.6 0 0 0	indow U-va	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = =	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07	as given in	paragraph	3.2	(27) (27) (27) (27) (29) (29) (29) (30) (31) (32)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of e Party wall Party floor Party ceiling * for windows and ** include the are	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45 elements,	m² ws, use e ides of ir	2.6 0 0 0	indow U-va	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07				(27) (27) (27) (29) (29) (29) (29) (30) (31) (32) (32a) (32b)
Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Roof Total area of e Party wall Party floor Party ceiling * for windows and ** include the are Fabric heat lo	e 2 e 3 e 4 38.14 23.92 5.95 29.51 20.45 elements, d roof window eas on both seeds on both seeds on both seeds on Seed	ws, use edides of ir	2.6 0 0 0 oriffective with atternal walk	ndow U-va	3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.51 20.45 117.9 12.35 76.06 55.61 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	- 0.04] = - 0.04] = - 0.04] = - 0.04] = - 0.04] = - =	3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43 3.07	2) + (32a).		40.9	(27) (27) (27) (29) (29) (29) (30) (31) (32) (32a) (32b)

can be used inste	ad of a da	tailed solo	ulation										
Thermal bridge				usina An	nendix l	K						23.27	(36)
if details of therma	•	,			•							23.21	(30)
Total fabric he	0 0		()	(• /			(33) +	(36) =			64.17	(37)
Ventilation hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer of	coefficier	nt, W/K		-	-	-		(39)m	= (37) + (37)	38)m	-	•	
(39)m= 81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
Heat loss para	meter (H	HLP), W/	m²K			-			Average = = (39)m ÷		12 /12=	80.13	(39)
(40)m= 1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
Number of day	s in moi	nth (Tab	le 1a)						Average =	Sum(40) ₁	12 /12=	1.05	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	inancy l	N									20	1	(42)
if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	9)	.38		(42)
Annual averag	e hot wa).82		(43)
Reduce the annua not more that 125	_				_	_	to achieve	a water us	se target o	f		l	
						•	Ι Δα	Can	004	Nav	Daa		
Jan Hot water usage i	Feb n litres per	Mar day for ea	Apr ach month	Vd,m = fa	Jun ctor from	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		
(1.7,		-							Total = Su	<u> </u>		1089.8	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x [OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
16 **** () ****			-6 (()		h (40		Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
If instantaneous w			,		· · ·		, ,	` ′	T		l	ı	(40)
(46)m= 22.22 Water storage	19.44 Ioss:	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Storage volum		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	, ,					_							. ,
Otherwise if no	stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact				or is kno	wn (kWł	n/day):					0		(48)
Temperature f											0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)	=			0		(50)
Hot water stor			-								0		(51)
If community h	•			`								ı	` '
Volume factor													
Temperature f			Ol-								0		(52) (53)

Energy lost fro		-	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (. , .	,									0		(55)
Water storage	loss cal	culated f	or each	month		,	((56)m = ((55) × (41)ı	m		•	•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m 	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (an	nual) fro	m Table	e 3							0		(58)
Primary circuit				,		` '	` '						
(modified by				·	1	i		· ·				1	4
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.91	44.31	47.2	43.89	43.5	40.31	41.65	43.5	43.89	47.2	47.47	50.91		(61)
Total heat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		(62)
Solar DHW input of	calculated	using App	endix G or	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	l lines if	FGHRS	and/or V	WHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter		!				!		!		•	
(64)m= 199.05	173.88	180.91	160.46	155.35	136.82	131.09	146.13	147.75	168.24	179.59	194.38		
	l	l .		l		·	Outp	out from wa	ater heate	<u>I </u>	12	1973.65	(64)
Heat gains from	m water	heating	k\/\/h/ma	onth 0 2	5 ′ [0 85	× (45)m					1	1	_
(65)m= 61.99		riodaii ig,	100011/1110		0 [0.00	X (10)11	. (0://:	.,	ι (10)	. (0,,,,,,	. (00)111	1	
	I 54.16	56.26	49.73	48.07	42.17	40.15	45	45.5	52.04	55.8	60.43		(65)
. ,	54.16	56.26	49.73	48.07	42.17	40.15	45 dwelling	45.5	52.04	55.8	60.43	eating	(65)
include (57)	m in calc	culation o	of (65)m	only if c	<u> </u>					<u> </u>		eating	(65)
include (57)	m in cald ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>					<u> </u>		eating	(65)
include (57) 5. Internal ga Metabolic gain	m in calc ains (see as (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal ga Metabolic gain Jan	m in caldains (see s (Table	culation of Table 5 (5), Wat Mar	of (65)m and 5a ts Apr	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal game Metabolic gain Jan (66)m= 119.19	m in cald ains (see s (Table Feb 119.19	ETable 5 5), Wat Mar	of (65)m and 5a ts Apr 119.19	only if control only if contro	Jun	Jul 119.19	Aug	or hot w	ater is fr	om com	munity h	neating	(65)
include (57) 5. Internal ga Metabolic gain Jan (66)m= 119.19 Lighting gains	m in calc ains (see s (Table Feb 119.19 (calcula	Explanation of Table 5 (a) Table 5 (b) Wat Mar (a) 119.19 (b) ted in Ap	of (65)m and 5a ts Apr 119.19	only if construction only if c	Jun 119.19	Jul 119.19 r L9a), a	Aug 119.19	Sep 119.19 Table 5	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81	m in calconins (see Feb 119.19 (calcula 16.71	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraint of the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraint of the constraints on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint of the constraint on th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	om com	munity h	neating	
include (57) 5. Internal ga Metabolic gain Jan (66)m= 119.19 Lighting gains	m in calconins (see Feb 119.19 (calcula 16.71	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if construction only if c	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a 7.01	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81	m in calc ains (see s (Table Feb 119.19 (calcula	Table 5 5), Wat Mar 119.19 ted in Ap	of (65)m and 5a ts Apr 119.19 opendix 10.29	only if construction only if c	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc	Table 5 25), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68	of (65)m and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L	Jul 119.19 r L9a), a 7.01 13 or L1	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 See Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	neating	(66) (67)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc	Table 5 25), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68	of (65)m and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L	Jul 119.19 r L9a), a 7.01 13 or L1	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 See Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	eating	(66) (67)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01 Cooking gains	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92	Table 5 5), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68 tted in Ap 34.92	of (65)m and 5a ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33 201.7	neating	(66) (67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01 Cooking gains (69)m= 34.92	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92	Table 5 5), Wat Mar 119.19 ted in Ap 13.59 ulated in 207.68 tted in Ap 34.92	of (65)m and 5a ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33 201.7	eating	(66) (67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances games (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3	m in calc ains (see s (Table Feb 119.19 (calcula: 16.71 ins (calc 213.2 (calcula: 34.92 ns gains 3	ted in Apulated in	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 3	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	neating	(66) (67) (68) (69)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail	m in calc ains (see s (Table Feb 119.19 (calcula: 16.71 ins (calc 213.2 (calcula: 34.92 ns gains 3	ted in Apulated in	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 3	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail (70)m= 3 Losses e.g. ev (71)m= -95.35	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5	of (65)m ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92 5a) 3 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7 34.92	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fail (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T	ted in Ap 13.59 ulated in Ap 34.92 (Table 5 3 on (negatine) and (n	of (65)m and 5a ts Apr 119.19 pendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ole 5)	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92 3	Nov 119.19 18.14 187.76 34.92	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5 3 on (negation) 75.62	of (65)m ts Apr 119.19 opendix 10.29 Append 195.93 opendix 34.92 5a) 3 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ble 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.14 187.76 34.92 3	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31 Total internal	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T 80.59 gains =	ted in Ap 13.59 ulated in Ap 207.68 at 14.92 (Table 5 3 on (negation) 75.62	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if constructions only if constructions	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ole 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a; 34.92 3 -95.35	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3 -95.35	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35 69.95 70)m + (7	Nov 119.19 18.14 187.76 34.92 3 -95.35 77.5 1)m + (72)	Dec 119.19 19.33 201.7 34.92 3 81.22 m	neating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal games Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fair (70)m= 3 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 83.31	m in calc ains (see s (Table Feb 119.19 (calcula 16.71 ins (calc 213.2 (calcula 34.92 ns gains 3 raporatio -95.35 gains (T 80.59 gains =	ted in Ap 13.59 ulated in Ap 207.68 ted in Ap 34.92 (Table 5 3 on (negation) 75.62	of (65)m and 5a ts Apr 119.19 pendix 10.29 Appendix 34.92 5a) 3 tive valu -95.35	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 tion L15 34.92 3 ble 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67), also se 34.92 3	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 3	Oct 119.19 15.54 ble 5 172.93 5 34.92 3 -95.35	Nov 119.19 18.14 187.76 34.92 3	Dec 119.19 19.33 201.7 34.92 3	eating	(66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

																_
Southwest	0	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	· <u> </u>	7.9	(79)
Southwest	0.9x 0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	-	•	59.56	(79)
Southwest	0.77 0.77	X	0.6	S5	X	9	2.85			0.24	X	0.7	=	-	7.03	(79)
Southwest	0.77 0.77	X	5.5	51	X	6	9.27]		0.24	X	0.7		•	44.43	(79)
Southwest	0.77 0.77	X	0.6	S5	x	6	9.27]		0.24	X	0.7	=		5.24	(79)
Southwest	0.77 0.77	X	5.5	51	x	4	4.07]		0.24	X	0.7	-		28.27	(79)
Southwest	0.77 0.77	x	0.6	35	x	4	4.07			0.24	X	0.7	=	-	3.34	(79)
Southwest	0.77	x	5.5	51	x	3	1.49			0.24	X	0.7	-	-	20.2	(79)
Southwest	0.77	X	0.6	65	x	3	1.49			0.24	X	0.7		•	2.38	(79)
				_	•											
Solar gain	s in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45	5.33 83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05			(83)
Total gain	s – internal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts						_			
(84)m= 42	0.22 455.76	489.61	527.34	553.86	54	12.21	515.23	483	.82	449.62	416.98	400.59	402.0	7		(84)
7. Mean	internal temp	perature	(heating	season)											
Tempera	ture during h	neating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	, Th	1 (°C)					21	(85)
•	n factor for g	•			-					,						
	an Feb	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec	;		
(86)m=	1 1	0.99	0.98	0.94	().81	0.65	0.7	-	0.91	0.99	1	1			(86)
Mean into	ernal tempe	ratura in	livina ar	 aa T1 (f(الد	w eta	ne 3 to 7	in T	ahle	a 0c)			1			
	9.82 19.93	20.14	20.43	20.72	_	0.92	20.98	20.9		20.83	20.47	20.1	19.8			(87)
` ′		l	<u> </u>	<u> </u>			l	<u> </u>				1				, ,
· —	ture during h	20.03	20.04	20.04	_	eiiing 0.05	20.05	20.0		20.05	20.04	20.04	20.03			(88)
(88)m= 20	7.02 20.03	20.03	20.04	20.04		0.05	20.05	20.0	05	20.05	20.04	20.04	20.03			(00)
	n factor for g	1	i	· · ·			i	<u> </u>					-	_		
(89)m=	1 1	0.99	0.98	0.91	().73	0.52	0.5	8	0.86	0.98	1	1			(89)
Mean into	ernal tempei	rature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_		
(90)m= 18	3.44 18.6	18.91	19.34	19.74	1	9.99	20.04	20.0	04	19.89	19.4	18.86	18.42			(90)
										f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean into	ernal tempei	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2						
	3.79 18.94	19.22	19.62	19.99	_	0.23	20.28	20.2		20.13	19.68	19.17	18.77			(92)
Apply ad	justment to t	he mear	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate					
(93)m= 18	3.64 18.79	19.07	19.47	19.84	2	0.08	20.13	20.	13	19.98	19.53	19.02	18.62			(93)
8. Space	heating req	uirement														
	the mean in		•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	:(76)m an	d re-ca	alcula	ite	
	ation factor fo			1	_			Π.		_		1	I _	_		
	an Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec			
	n factor for g	1		0.0		7.4	0.50		1	0.00	0.00	1 0 00	 			(94)
(* 1/111	1 1	0.99	0.97	0.9).74	0.53	0.5	9	0.86	0.98	0.99	1			(34)
	9.06 453.6	, VV = (94 484.5	511.13	500.36	3	99.6	274.65	286	07	386.78	407.18	398.45	401.19	<u> </u>		(95)
	average exte	l .	<u> </u>		<u> </u>		214.00	200	.01	550.76	707.10	1 330.43	T-01.18			(00)
	1.3 4.9	6.5	8.9	11.7	_	14.6	16.6	16.	_{.4} I	14.1	10.6	7.1	4.2	٦		(96)
	s rate for me		<u> </u>				<u> </u>					1				(= =/
	69.2 1129.63	1		651.18	_	32.98	279.26	293.	_ т	467.13	714.04	958.41	1164.6	8		(97)
(* / * [11		1			`							1				, ,

Space heatir	T i i	r	1	1	I	I		i		r	500.04		
(98)m= 558.1	454.29	398.23	242.19	112.21	0	0	0 Tota	0 I per vear	228.31 (kWh/year	403.17 r) = Sum(9	568.04	2964.54	(98)
Space heatir	na requir	ement in	k\/\/h/m²	2/vear			rota	ii per year	(KVVIII) you) = Gam(o	O)15,912 —	38.98	(99)
·	• •			/youi							l		
8c. Space co	Ĭ			See Tal	ole 10h								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rat	e Lm (ca	lculated	using 2	5°C inter	nal tem	perature		ernal ten	nperatur	e from T	able 10)		
100)m= 0	0	0	0	0	743.01	584.92	599.29	0	0	0	0		(100
Utilisation fa	ctor for lo	ss hm											
101)m= 0	0	0	0	0	0.83	0.9	0.87	0	0	0	0		(101
Useful loss,	`		` 	(101)m					ī		r 1		
102)m= 0	0	0	0	0	614.95	527.28	524.16	0	0	0	0		(102
Gains (solar	gains ca	lculated 0	for appli	cable we	713.8	egion, se 680.73	645.01	10)	0	0	0		(103
103)m= 0 Space coolir		l		<u> </u>								(11)m	(103
set (104)m to	•				iweiiiig,	COMMIN	ous (KVV	11) = 0.0	24 X [(10)3)III — (102)111])	. (41 <i>)</i> 111	
104)m= 0	0	0	0	0	71.18	114.17	89.91	0	0	0	0		
						!	•	Total	= Sum(104)	=	275.25	(104
Cooled fraction								f C =	cooled	area ÷ (4	4) = [0.59	(105
ntermittency	- `		i –			0.05	0.05						
106)m= 0	0	0	0	0	0.25	0.25	0.25	0 Tota	0	(104)	0		7/400
Space cooling	ı requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	rota	I = Sum(104)	= [0	(106
107)m= 0	0	0	0	0	10.41	16.7	13.15	0	0	0	0		
	Į	<u> </u>				l	<u> </u>	Total	= Sum(107)	=	40.26	(107
Space cooling	require	ment in k	(Wh/m²/y	/ear				(107)) ÷ (4) =		[0.53	(108
a. Energy re	guiremer	nts – Indi	ividual h	eating s	vstems i	ncludino	ı micro-C	CHP)	. ,		L		
Space heati				<u> </u>	,			,					
Fraction of s	pace hea	at from s	econdar	y/supple	mentary	system						0	(201
Fraction of s	pace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =			Ī	1	(202
Fraction of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =		İ	1	(204
Efficiency of	main spa	ace heat	ing syste	em 1								89.5	(206
Efficiency of	seconda	ry/supple	ementar	y heatin	g systen	ղ, %						0	(208
Cooling Syst	em Ener	av Efficie	encv Ra	tio								4.73	(209
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	」
Space heating			<u> </u>		l	Jui	Aug	Seb	Oct	INOV	Dec	KVVII/ye	aı
558.1	454.29	398.23	242.19	112.21	0	0	0	0	228.31	403.17	568.04		
 211)m = {[(98)6)	<u> </u>	!	I	Į	<u> </u>	I			(211
623.58	507.58	444.95	270.61	125.38	0	0	0	0	255.09	450.47	634.68		(211
		<u> </u>	<u> </u>	<u></u>	<u> </u>	<u> </u>				211) _{15,1012}		3312.34	(211
Space heatir	na fuel (s	econdar	v). kWh/	month						, 10 12	l		`
= {[(98)m x (2	•		• , .										
215)m= 0	0	0	0	0	0	0	0	0	0	0	0		
	-		-	-	-	=	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u> </u>	0	(215

Output from water heater (calculated above)								
	136.82 131.09	146.13	147.75	168.24	179.59	194.38		
Efficiency of water heater							89.5	(216
(217)m= 89.5 89.5 89.5 89.5 89.5	89.5 89.5	89.5	89.5	89.5	89.5	89.5		(217
Fuel for water heating, kWh/month								
(219) m = (64) m x $100 \div (217)$ m (219)m = 222.41 194.28 202.13 179.28 173.58 1	152.88 146.47	163.28	165.08	187.98	200.66	217.18		
		Total	= Sum(2	19a) ₁₁₂ =			2205.19	(219
Space cooling fuel, kWh/month.						•		
$(221)m = (107)m \div (209)$ $(221)m = 0 $	2.2 3.53	2.78	0	0	0	0		
		Total	= Sum(22	21) ₆₈ =	<u>I</u>	!	8.52	(221
Annual totals				k\	Wh/yeaı	, <u>'</u>	kWh/year	_
Space heating fuel used, main system 1							3312.34	
Water heating fuel used							2205.19	
Space cooling fuel used							8.52]
Electricity for pumps, fans and electric keep-hot								
mechanical ventilation - balanced, extract or pos	sitive input fror	m outside	•			162.85		(230
central heating pump:						30		(230
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			192.85	(231
Electricity for lighting							332.22	
12a. CO2 emissions – Individual heating system	is including mi	icro-CHP						(232
								(232
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	
Space heating (main system 1)					2/kWh	tor = [
	kWh/year			kg CO	2/kWh		kg CO2/yea	r
Space heating (main system 1)	kWh/year			kg CO:	2/kWh	= [kg CO2/yea	r](261
Space heating (main system 1) Space heating (secondary)	kWh/year (211) x (215) x		264) =	0.2 0.5	2/kWh	= [kg CO2/yea	r](261](263
Space heating (main system 1) Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x		264) =	0.2 0.5	2/kWh 16 19	= [715.46 0 476.32	r](261](263](264
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262)		264) =	0.2 0.5 0.2	2/kWh 16 19 16	= [= [= [715.46 0 476.32 1191.79	r](261](263](264](265
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling	kWh/year (211) x (215) x (219) x (261) + (262) (221) x		264) =	0.2 0.5 0.5	2/kWh 16 19 16 19	= [= [= [715.46 0 476.32 1191.79 4.42	r](261](263](264](265](266
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) (221) x (231) x			0.2 0.5 0.5 0.5	2/kWh 16 19 16 19 19 19	= [= [= [= [715.46 0 476.32 1191.79 4.42 100.09	r](261](263](264](265
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot Electricity for lighting	kWh/year (211) x (215) x (219) x (261) + (262) (221) x (231) x		sum o	0.5 0.5 0.5 0.5 0.5	2/kWh 16 19 16 19 19 19	= [= [= [= [kg CO2/yea 715.46 0 476.32 1191.79 4.42 100.09	r](261](263](264](265](266](267

			l Iser [Details:						
Assessor Name:	Chris Hockr	noll	00011		a Num	hori		STD()	016363	
Software Name:	Stroma FSA				a Num are Vei				on: 1.0.4.10	
			Property	Address						
Address :										
1. Overall dwelling dime	ensions:									
Danamant				ea(m²)	l., ,		ight(m)	1,- ,	Volume(m³)	_
Basement				54.34	(1a) x	2	2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1	ld)+(1e)+(1	n)	54.34	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	(3n) =	141.28	(5)
2. Ventilation rate:										
	main heating	seconda heating	ıry	other		total			m³ per hou	ſ
Number of chimneys	0	+ 0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	+	0	- -	0	x	20 =	0	(6b)
Number of intermittent fa	ins	J L				0	x -	10 =	0	(7a)
Number of passive vents	;				F	0	x -	10 =	0	
Number of flueless gas f					F	0	X 4	40 =	0	(7c)
realiser of fideless gas in	1100				L				0	(/ C)
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fa	ns = (6a)+(6b)+	(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	een carried out or i	is intended, proce	ed to (17),	otherwise (continue fr	om (9) to (_
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration	0=1						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0 if both types of wall are p					•	uction			0	(11)
deducting areas of openi	*	, ,	io ino grea	nor wan are	a (anoi					
If suspended wooden	floor, enter 0.2 ((unsealed) or ().1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•								0	(13)
Percentage of window	s and doors dra	ught stripped		0.05 10.0) (4 4) 4	1001			0	(14)
Window infiltration				0.25 - [0.2]	. ,	100] = 12) + (13) -	ı (15) —		0	(15)
Infiltration rate Air permeability value,	a50 everesse	t in cubic metr	as nar h					area	0	(16)
If based on air permeabil	•		•	•	•	elle oi e	ilvelope	aica	0.15	(17)
Air permeability value applie	-					is being u	sed		0.10	()
Number of sides sheltered	ed								2	(19)
Shelter factor					[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	_			(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f	 	<u> </u>	1	T .		<u> </u>	·	_	1	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp				1		1	1		1	
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2h) _ (22c	a) v Emy (nguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\frac{1}{0} = \frac{2}{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=		-	(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

Ventila	ation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		
Heat Ic	oss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	81.67	(39)
(40)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		
Numbe	er of day	s in moi	nth (Tab	le 1a)				•	,	Average =	Sum(40) ₁ .	12 /12=	1.5	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
Assum if TF if TF Annual	ned occur FA > 13.9 FA £ 13.9 I averag the annua	pancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	[1 - exp	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9) 77	kWh/ye	ion.	(42
	e that 125 Jan	_		• .		-	-	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	day for ea	<u> </u>			Table 1c x				<u> </u>			
(44)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
Energy (content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		928.53	(44
(45)m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
lf instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Γotal = Su	m(45) ₁₁₂ =		1217.45	(45
(46)m=	18.93	16.56	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		(46
	storage											•		
If comr Otherw Water	e volum munity h vise if no storage nanufact	eating a stored loss:	ind no ta hot wate	ink in dw er (this in	velling, e ncludes i	nter 110 nstantar	litres in neous co	(47)			47)	0		(47
•	erature fa					`	3,					0		(49
	lost fro				ear			(48) x (49)	· =			0		(50
b) If m Hot wa	nanufact ater stora munity h	urer's de age loss	eclared of factor fr	cylinder I com Tabl	oss fact		known:					0		(51
	e factor	_		011 4.5								0		(52
	erature fa			2b								0		(52
•	/ lost fro				ear			(47) x (51)	x (52) x (53) =		0		` (54
=nerav			_							•				(55
	(50) or (54) in (5	5)									0		(50
Enter	(50) or (storage		•	for each	month			((56)m = (55) × (41)ı	m		0		(00

If cylinder cor	ntains dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	om Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary cir	cuit loss (ar	nnual) fro	om Table	 - 3			•	•	•		0		(58)
Primary cir	cuit loss ca	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified	d by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss	calculated	for each	month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 43.	37.75	40.22	37.4	37.06	34.34	35.49	37.06	37.4	40.22	40.45	43.37		(61)
Total heat	required for	water he	eating ca	alculated	for eac	h month	(62)m =	: 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 169	9.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		(62)
Solar DHW in	put calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add addition	onal lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)				_	
(63)m = 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	n water hea	ter											
(64)m= 169	9.6 148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		_
							Outp	out from wa	ater heate	r (annual)₁	12	1681.59	(64)
Heat gains	from water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m= 52.	81 46.14	47.93	42.37	40.95	35.93	34.21	38.34	38.77	44.34	47.54	51.49		(65)
include (57)m in cal	culation (of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Interna	al gains (see	e Table 5	and 5a):									
Metabolic o	gains (Table	e 5). Wat	ts										
Ja		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 90	.9 90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9		(66)
Lighting ga	ins (calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				•	
(67)m= 14.	13 12.55	10.21	7.73	5.78	4.88	5.27	6.85	9.19	11.67	13.62	14.52		(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•	•	•	
(68)m= 158	3.48 160.13	155.98	147.16	136.02	125.56	118.56	116.92	121.06	129.89	141.02	151.49		(68)
Cooking ga	ains (calcula	ated in A	ppendix	L, equat	tion L15	or L15a)), also se	ee Table	5		•	•	
(69)m= 32.	.09 32.09	32.09	32.09	32.09	32.09	32.09	32.09	32.09	32.09	32.09	32.09		(69)
Pumps and	d fans gains	(Table 5	Ба)				•	•	•	•	•	•	
(70)m= 3	3 3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g	. evaporatio	n (nega	tive valu	es) (Tab	le 5)								
(71)m= -72	.72 -72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72	-72.72		(71)
Water heat	ting gains (rable 5)	!	!	!	!	!	!	!	!	!	•	
vvator ricat	<u>`</u>		r	55.04	49.9	45.98	51.53	53.85	59.6	66.03	69.2		(72)
(72)m= 70.	.98 68.67	64.43	58.85	35.04	1								
(72)m= 70.			58.85	55.04		m + (67)m	n + (68)m -	+ (69)m + ((70)m + (7	1)m + (72))m	•	
(72)m= 70.	nal gains =		267.01	250.11		m + (67)m 223.08	228.57	+ (69)m + ((70)m + (7 254.43	1)m + (72) 273.94	m 288.49]	(73)
(72)m= 70. Total inter	nal gains =		!	!	(66)				•		·		(73)
(72)m= 70. Total inter (73)m= 296 6. Solar g	nal gains =	283.88	267.01	250.11	(66)	223.08	228.57	237.37	254.43	273.94	288.49		(73)
(72)m= 70. Total inter (73)m= 296 6. Solar g Solar gains	nal gains = 5.87 294.61 ains:	283.88 using sola	267.01	250.11 Table 6a	(66) 233.6 and assoc	223.08	228.57	237.37	254.43 ne applicat	273.94	288.49	Gains (W)	(73)

		, ,								_		_
Northeast _{0.9x}	0.77	X	7.15	X	11.28	X	0.24	×	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.97	X	0.24	x	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	X	7.15	X	41.38	X	0.24	x	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	X	7.15	X	67.96	X	0.24	x	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	X	7.15	X	91.35	X	0.24	x [0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	X	7.15	X	97.38	X	0.24	x [0.7	=	162.13	(75)
Northeast 0.9x	0.77	X	7.15	x	91.1	x	0.24	x [0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	X	7.15	x	72.63	X	0.24	x [0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	X	7.15	x	50.42	X	0.24	x	0.7	=	83.94	(75)
Northeast 0.9x	0.77	x	7.15	x	28.07	X	0.24	x [0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	x	7.15	x	14.2	x	0.24	_ x	0.7	_ =	23.64	(75)
Northeast _{0.9x}	0.77	x	7.15	x	9.21	x	0.24	= x	0.7	-	15.34	(75)
Southwest _{0.9x}	0.77	x	2.19	x	36.79		0.24	_ x	0.7	<u> </u>	9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.79		0.24	= x	0.7	<u> </u>	3.21	(79)
Southwest _{0.9x}	0.77	x	2.19	x	62.67		0.24	x	0.7	=	15.98	(79)
Southwest _{0.9x}	0.77	x	0.75	x	62.67		0.24	= x [0.7	-	5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	x	85.75		0.24	= x	0.7	=	21.86	(79)
Southwest _{0.9x}	0.77	x	0.75	x	85.75		0.24	x	0.7	=	7.49	(79)
Southwest _{0.9x}	0.77	X	2.19	x	106.25	j	0.24	T x	0.7	=	27.09	(79)
Southwest _{0.9x}	0.77	х	0.75	x	106.25	İ	0.24	x	0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	х	2.19	x	119.01	İ	0.24	_ x	0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	x	0.75	x	119.01	j	0.24	_ x [0.7	=	10.39	(79)
Southwest _{0.9x}	0.77	х	2.19	x	118.15	İ	0.24	x	0.7	=	30.12	(79)
Southwest _{0.9x}	0.77	х	0.75	x	118.15	İ	0.24	= x	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	x	2.19	x	113.91	j	0.24	= x [0.7	=	29.04	(79)
Southwest _{0.9x}	0.77	x	0.75	x	113.91		0.24	= x	0.7	=	9.95	(79)
Southwest _{0.9x}	0.77	x	2.19	x	104.39		0.24	x	0.7	=	26.62	(79)
Southwest _{0.9x}	0.77	x	0.75	x	104.39		0.24	= x [0.7	<u> </u>	9.12	(79)
Southwest _{0.9x}	0.77	X	2.19	x	92.85		0.24	x	0.7	=	23.67	(79)
Southwest _{0.9x}	0.77	X	0.75	x	92.85		0.24	_ x	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	x	2.19	x	69.27		0.24	= x [0.7	<u> </u>	17.66	(79)
Southwest _{0.9x}	0.77	x	0.75	x	69.27		0.24	x [0.7	=	6.05	(79)
Southwest _{0.9x}	0.77	x	2.19	x	44.07		0.24	_ x [0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	x	0.75	x	44.07		0.24	= x [0.7	<u> </u>	3.85	(79)
Southwest _{0.9x}	0.77	x	2.19	x	31.49		0.24	= x	0.7	-	8.03	(79)
Southwest _{0.9x}	0.77	x	0.75	x	31.49		0.24	= x [0.7	-	2.75	(79)
_				-								_
Solar gains in v	vatts, calcul	ated	for each mon	th_		(83)m	= Sum(74)m .	(82)m				
(83)m= 31.38		.24	149.51 192.8		02.57 190.66	156	.65 115.73	70.44	38.72	26.12		(83)
Total gains – in	i		` 	- `	<u> </u>						I	
(84)m= 328.25	354.3 382	2.13	416.51 442.9	3 4	36.18 413.74	385	.22 353.1	324.87	312.66	314.61		(84)
7. Mean interr	nal temperat	ture (heating seaso	n)								
Temperature of	during heati	ng pe	eriods in the li	ving	area from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fact	<u>_</u>	$\overline{}$		m (s	ee Table 9a)				, , , , , , , , , , , , , , , , , , , 		 I	
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(86)m=	1	1	0.99	0.98	0.95	0.87	0.74	0.79	0.94	0.99	1	1		(86)
Mean	internal	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.29	19.42	19.68	20.06	20.45	20.77	20.92	20.89	20.63	20.14	19.66	19.27		(87)
Temr	erature	durina h	eating p	erinds ir	rest of	dwelling	from Ta	hle 0 T	h2 (°C)					
(88)m=	19.67	19.67	19.67	19.68	19.69	19.7	19.7	19.7	19.69	19.69	19.68	19.68		(88)
						l	l							. ,
			ains for	r		`	i e			T	0.00			(00)
(89)m=	1	1	0.99	0.97	0.92	0.78	0.57	0.64	0.89	0.98	0.99	1		(89)
Mean	interna	temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	le 9c)				
(90)m=	17.43	17.62	18	18.55	19.11	19.53	19.66	19.65	19.36	18.68	17.97	17.4		(90)
									1	fLA = Livin	g area ÷ (4	4) =	0.25	(91)
Mean	internal	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	A) x T2			·		
(92)m=	17.9	18.07	18.42	18.93	19.45	19.84	19.98	19.96	19.68	19.05	18.39	17.87		(92)
	/ adiustn	nent to t	he mear	ı interna	L I temper	ı ature fro	ı m Table	4e. whe	ere appro	u opriate				
(93)m=	17.75	17.92	18.27	18.78	19.3	19.69	19.83	19.81	19.53	18.9	18.24	17.72		(93)
8. Sp	ace hea	ting requ	uirement											
					re obtair	ned at ste	ep 11 of	Table 9	b, so tha	nt Ti,m=(76)m an	d re-calc	ulate	
			or gains	•						, (
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	0.99	0.99	0.99	0.97	0.91	0.78	0.59	0.65	0.88	0.97	0.99	1		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m=	326.57	351.63	376.76	402.47	403.73	340.22	244.91	251.11	311.23	316.23	310.03	313.26		(95)
Mont	hly avera	age exte	rnal tem	perature	from Ta	able 8		_	_					
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1112.66	1075.06	970.08	807.3	619.43	411.21	260.89	275	440.25	676.65	912.25	1110.74		(97)
Spac	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	584.85	486.15	441.43	291.48	160.48	0	0	0	0	268.16	433.6	593.32		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3259.46	(98)
Spac	e heating	g require	ement in	kWh/m²	²/year								59.98	(99)
8c S	nace co	olina rea	uiremen	nt .	•									
		Ĭ	July and		Soo Tal	hle 10h								
Calco	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat			l	<u> </u>		l	l		<u> </u>		l	able 10)		
(100)m=		0	0	0	0	759.65	598.02	613.05	0	0	0	0		(100)
					l		1	l		1		1		
			ss hm	<u> </u>			•							
Utilisa	ation fac		ss hm	0	0	0.68	0.76	0.72	0	0	0	0		(101)
Utilisa (101)m=	ation fac	tor for lo	0				0.76	0.72	0	0	0	0		(101)
Utilisa (101)m= Usefu	ation fac	tor for lo	1				0.76	0.72	0	0	0	0		(101) (102)
Utilisa (101)m= Usefu (102)m=	ation fac 0 ul loss, h	tor for Ic 0 mLm (V 0	0 /atts) = ((100)m x	(101)m	513.49	456.79	444.35	0					
Utilisa (101)m= Usefu (102)m=	ation fac 0 ul loss, h 0 s (solar g	tor for Ic 0 mLm (V 0	0 /atts) = ((100)m x	(101)m	513.49	456.79	444.35	0					` '
Utilisa (101)m= Usefu (102)m= Gains (103)m=	ation fac 0 ul loss, h 0 s (solar o	tor for lo	0 /atts) = ((100)m x 0 for appli	(101)m 0 cable w	513.49 eather re 570.35	456.79 egion, se 543.05	444.35 ee Table 510.34	0 10) 0	0	0	0	x (41)m	(102)
Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	ation fac	tor for lo	0 /atts) = ((100)m x 0 for appli 0 r month,	(101)m 0 cable we	513.49 eather re 570.35	456.79 egion, se 543.05	444.35 ee Table 510.34	0 10) 0	0	0	0	x (41)m	(102)
Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	ation fac 0 ul loss, h 0 s (solar of the cooling of the coolin	tor for lo	0 Vatts) = (0 Iculated 0 ement fo	(100)m x 0 for appli 0 r month,	(101)m 0 cable we	513.49 eather re 570.35	456.79 egion, se 543.05	444.35 ee Table 510.34	0 10) 0	0	0	0	x (41)m	(102)
Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1	ation fac 0 ul loss, h 0 s (solar of the cooling of the coolin	tor for lo	0 Vatts) = (0 Iculated 0 ement fo 104)m <	(100)m x 0 for appli 0 r month, 3 x (98	cable wo	513.49 eather re 570.35	456.79 egion, se 543.05 continue	444.35 ee Table 510.34 ous (kW	0 10) 0 /h) = 0.0	0 0 24 x [(10	0 0 03)m – (0 0 102)m];	x (41)m 113.27	(102)

Cooled fractio	n							f C =	cooled	area ÷ (4	1) =	0.7	(105)
Intermittency		able 10b)								'' [_`′
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
						!	!	Tota	l = Sum(104)	=	0	(106)
Space cooling	require	ment for	month =	(104)m	× (105)	× (106)r	n						_
(107)m= 0	0	0	0	0	0	11.22	8.58	0	0	0	0		
								Total	l = Sum(107)	= [19.8	(107)
Space cooling	require	ment in k	kWh/m²/y	/ear				(107)) ÷ (4) =		Ī	0.36	(108)
9a. Energy re	quiremer	nts – Indi	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)			_		
Space heati	ng:										_		
Fraction of s	pace hea	at from s	econdar	y/supple	mentary	system						0	(201)
Fraction of s	oace hea	at from m	nain syst	em(s)			(202) = 1	- (201) =			Γ	1	(202)
Fraction of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =		Ī	1	(204)
Efficiency of	main spa	ace heat	ing syste	em 1							Ţ	89.5	(206)
Efficiency of	-		• .		a system	ղ. %					ļ	0	(208)
Cooling Syst					g 0,010	., 70					L T	4.73	(209)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heatin	1g require 486.15	441.43	291.48	160.48	0	0	0	0	268.16	433.6	593.32		
			l		U				200.10	433.0	595.52		
$(211)m = \{[(98)]$	i 		 			· .	T .	Ι.					(211)
653.46	543.18	493.22	325.68	179.3	0	0	0	0	299.62	484.46	662.93		٦
							Tota	al (kWh/yea	ar) =Sum(2	211) _{15,1012}	F [3641.85	(211)
Space heating	•		• /	month									
$= \{[(98) \text{m x } (245) \text{m}]$	 	<u> </u>	r -	_				0	0				
(215)m= 0	0	0	0	0	0	0	O Tota	l (kWh/yea	_	0	0		7(045)
144 1 4							TOTA	ii (KVVII/yea	ar) =50111(2	213) _{15,1012}	- L	0	(215)
Water heating Output from w	_	tor (colo	ulated a	hovo)									
169.6	148.15	154.14	136.71	132.36	116.58	111.69	124.51	125.88	143.34	153.02	165.61		
Efficiency of w	<u> </u>	ı ater				l	l	<u> </u>	l			89.5	(216
(217)m= 89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		` (217)
Fuel for water													
(219)m = (64)	•												
(219)m= 189.49	165.53	172.22	152.75	147.89	130.25	124.79	139.11	140.65	160.16	170.97	185.04		
			-		-	-	Tota	I = Sum(2	19a) ₁₁₂ =	-		1878.87	(219)
Space coolin			nth.								_		
(221)m = (107)	í ì	ŕ						1		г			
(221)m= 0	0	0	0	0	0	2.37	1.82	0	0	0	0		_
							Tota	al = Sum(2	21) ₆₈ =		Ĺ	4.19	(221)
Annual totals	•								k\	Wh/year	-	kWh/yea	<u>r</u>
Space heating	g fuel use	ed, main	system	1								3641.85	
Water heating	fuel use	ed									ſ	1878.87	
Space cooling	ı fuel use	ed									Ī	4.19	Ħ
5F 230 000m16	,	-									L	7.10	

Electricity for pumps, fans and electric keep-hot

mechanical ventilation - balanced, extract or positive input from outside

central heating pump:

Total electricity for the above, kWh/year

Electricity for lighting

Electricity for lighting

Energy

Emission factor

Emission factor

Emission factor

Emission factor

Emission factor

Emissions

Emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	786.64 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	405.84 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1192.47 (265)
Space cooling	(221) x	0.519 =	2.18 (266)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	62.54 (267)
Electricity for lighting	(232) x	0.519 =	129.5 (268)
Total CO2, kg/year	sum	of (265)(271) =	1386.69 (272)
Dwelling CO2 Emission Rate	(272	2) ÷ (4) =	25.52 (273)
El rating (section 14)			81 (274)

		l Isar I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	roperty	Address	Flat 4-2	2-Lean				
Address: 1. Overall dwelling dime	ensions:								
1. Overall aweiling aime		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement			55.61	(1a) x	2	2.6	(2a) =	144.59	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) = = :	55.61	(4)			-		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	144.59	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	7 + [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x '	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_			A * I		
	(0.) (0.)	- > (-1)	(-)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		.a to (),			o (o) to	(1.0)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
deducting areas of openi	resent, use the value corresponding t ngs); if equal user 0.35	o ine grea	ter wan are	a (aitei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2	v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metre	es per ho					area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$	-	•	•				0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			<u> </u>
Number of sides sheltere	ed		(20) = 1 -	10 075 v (1	10)1 –			3	(19)
Shelter factor Infiltration rate incorpora	ting shalter factor		(20) = 13 (21) = (18)		19)] =			0.78	(20)
Infiltration rate modified t	•		(21) = (10	/ X (20) =				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	<u> </u>		1	1		ı	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) == (2	2)m : 4							-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]	
(-24)	1 0.95	1 0.00	1 3.32		L	12	Lo	J	

Adjusted infiltra	ation rate (allo	owing for s	helter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effec	-	ge rate for	he appli	cable ca	se	•		•		•		
	al ventilation:	on an all a NL 76	201-) (00-	-) - - (-		MEW - de -		\ (00-\			0.5	(238
	eat pump using A							o) = (23a)			0.5	(23)
	n heat recovery: e	-	_								76.5	(230
	ed mechanical		1		<u> </u>	- ^ ` 	í `	 		- ` ` `) ÷ 100] 1	(0.4
(24a)m= 0.27	0.26 0.26		0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(248
· ·	ed mechanical	- I	1	1		- 	ŕ	<u> </u>		<u> </u>	1	(0.4)
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24
•	ouse extract vn $< 0.5 \times (23b)$			-				.5 × (23b)		_	
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
,	ventilation or ventil		•					0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate -	enter (24a	a) or (24l	b) or (24	c) or (24	d) in box	(25)	•		•		
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(25)
3. Heat losse	s and heat los	s paramet	er:			•	•			•		
ELEMENT	Gross area (m²)	Openir n	ngs n²	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-	-	A X k kJ/K
Doors				2.6	X	1.2	=	3.12				(26)
Windows Type) 1			7.15	x1	/[1/(1.2)+	0.04] =	8.19				(27)
Windows Type	2			2.19	x1	/[1/(1.2)+	0.04] =	2.51				(27)
Windows Type	3 3			0.75	x1	/[1/(1.2)+	0.04] =	0.86				(27)
Walls Type1	34.66	17.2	4	17.42	<u> </u>	0.15		2.61	=			(29)
Walls Type2	23.92	2.6		21.32	<u> </u>	0.15		3.2			i i	(29)
Walls Type3	2.63	0	=	2.63	= x	0.15	=	0.39	=		-	(29)
Walls Type4	25.13	0	=	25.13	=	0.15		3.77	ᆿ ¦		╡┝	(29)
Roof	55.61	0	=	55.61	=	0.15		8.34	ᆿ ¦		룩 늗	(30)
Total area of e				141.9	=	0.13		0.04				(31)
Party wall	iomonto, m				=		—	0				
i aity wali				7.81	x	0	=	0	<u> </u>		_	(32)
•				55.61					e aires is	naragrar		(32
Party floor	roof windows us	o offootivo w	indow II v	الروامة	atad uning	r formula 1	/[/1/ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					
Party floor * for windows and					ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	s giveri ili	i parayrapi	. 0.2	
Party floor * for windows and ** include the area	as on both sides o	of internal wa			ated using	g formula 1 (26)(30)		ıе)+0.04] а	s giveri ili	i paragrapi	41.18	(33)
Party floor * for windows and ** include the area Fabric heat los	as on both sides on ss, W/K = S (A	of internal wa x X U)			ated using) + (32) =	(30) + (32				
Party floor * for windows and ** include the area Fabric heat los Heat capacity	as on both sides on ss, W/K = S (A Cm = S(A x k	of internal wa x x U))	lls and par	titions) + (32) = ((28).		2) + (32a).		41.18	19 (34)
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	as on both sides of ss, W/K = S (A Cm = S(A x k parameter (T sments where the	of internal wa. X X U) MP = Cm - details of the	lls and par ÷ TFA) ir	titions n kJ/m²K		(26)(30)) + (32) = ((28). Indica	(30) + (32	2) + (32a). Medium	(32e) =	41.18	
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both sides on so, W/K = S (A x k) Cm = S(A x k) parameter (The same to	of internal wad (x U)) MP = Cm - details of the alculation.	: TFA) ir	n kJ/m²K tion are not	t known p	(26)(30)) + (32) = ((28). Indica	(30) + (32	2) + (32a). Medium	(32e) =	41.18	(34)

Total fabric heat loss							(33) +	(36) =		í	69.75	(37)
Ventilation heat loss ca	lculated	l monthly	V				` '	` '	25)m x (5)		09.73	(07)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 12.68 12.54	12.4	11.71	11.57	10.88	10.88	10.74	11.15	11.57	11.85	12.12		(38)
Heat transfer coefficien	nt, W/K			ı	I		(39)m	= (37) + (37)	38)m			
(39)m= 82.42 82.28	82.15	81.45	81.31	80.62	80.62	80.48	80.9	81.31	81.59	81.87		
Heat loss parameter (H	ILP), W/	m²K		•	•			Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	81.42	(39)
(40)m= 1.48 1.48	1.48	1.46	1.46	1.45	1.45	1.45	1.45	1.46	1.47	1.47		
Number of days in mor	nth (Tab	le 1a)					i	Average =	Sum(40) ₁ .	12 /12=	1.46	(40)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28	31	30	31	30	31	31	30	31	30	31		(41)
· · · · · ·												
4. Water heating ener	gy requi	irement:								kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		86		(42)
if TFA £ 13.9, N = 1 Annual average hot wa Reduce the annual average								se target o		.26		(43)
not more that 125 litres per p				_	-	io domovo	a water ac	o target e	•			
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per	day for ea		Vd,m = fa	ctor from T	Table 1c x							
(44)m= 86.09 82.96	79.83	76.7	73.57	70.44	70.44	73.57	76.7	79.83	82.96	86.09		
Energy content of hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	т х пт х <u>Г</u>	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		939.13	(44)
(45)m= 127.67 111.66	115.22	100.45	96.39	83.17	77.07	88.44	89.5	104.3	113.85	123.64		
		<u> </u>	<u> </u>	<u> </u>	!	!		Γotal = Su	m(45) ₁₁₂ =	=	1231.35	(45)
If instantaneous water heating	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46)	to (61)				1	
(46)m= 19.15 16.75	17.28	15.07	14.46	12.48	11.56	13.27	13.42	15.65	17.08	18.55		(46)
Water storage loss: Storage volume (litres)	includin	na anv sa	olar or W	/WHRS	storage	within sa	ime vess	sel		0		(47)
If community heating a		•			_		1110 700	301		0		(47)
Otherwise if no stored			_			. ,	ers) ente	er '0' in (47)			
Water storage loss:												
a) If manufacturer's de	clared l	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature factor from	m Table	2b								0		(49)
Energy lost from water	_	-				(48) x (49)	=			0		(50)
b) If manufacturer's de Hot water storage loss	factor fr	om Tabl								0		(51)
If community heating so Volume factor from Take		011 4.3								0		(52)
Temperature factor from		2b								0		(52)
Energy lost from water			ear			(47) x (51)	x (52) x (5	53) =		0		(54)
Enter (50) or (54) in (5	_									0		(55)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	m Table	3	=	-	=				0		(58)
Primary circui	`	,			59)m = ((58) ÷ 36	65 × (41)	m				l	
(modified b				•	•	` '	, ,		r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 43.87	38.18	40.68	37.82	37.49	34.74	35.89	37.49	37.82	40.68	40.91	43.87		(61)
Total heat red	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 171.53	149.84	155.9	138.27	133.87	117.91	112.97	125.93	127.32	144.98	154.76	167.51		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from v	ater hea	ter			-	-	-			-	-		
(64)m= 171.53	149.84	155.9	138.27	133.87	117.91	112.97	125.93	127.32	144.98	154.76	167.51		
	•	•				•	Outp	out from wa	ater heate	r (annual)₁	12	1700.79	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	([(46)m	+ (57)m	+ (59)m	1	_
(65)m= 53.42	46.67	48.48	42.86	41.42	36.34	<u> </u>	<u> </u>			<u> </u>	<u> </u>	·	(05)
		70.70	42.00	41.42	30.34	34.6	38.78	39.21	44.85	48.08	52.08		(65)
include (57	m in cal				l .	<u> </u>	<u> </u>			<u> </u>		eating	(65)
include (57)		culation (of (65)m	only if c	l .	<u> </u>	<u> </u>			<u> </u>		eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	l .	<u> </u>	<u> </u>			<u> </u>		eating	(65)
· ·	ains (see	culation of Table 5	of (65)m and 5a ts	only if c	l .	<u> </u>	dwelling			<u> </u>		eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	<u> </u>	or hot w	ater is fr	om com	munity h	eating	(66)
5. Internal g Metabolic gai	ains (see ns (Table Feb 92.76	e Table 5 e 5), Wat Mar 92.76	of (65)m 5 and 5a ts Apr 92.76	only if controls: May 92.76	ylinder is Jun 92.76	Jul 92.76	Aug 92.76	or hot w Sep 92.76	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gair Jan (66)m= 92.76	ains (see ns (Table Feb 92.76	e Table 5 e 5), Wat Mar 92.76	of (65)m 5 and 5a ts Apr 92.76	only if controls: May 92.76	ylinder is Jun 92.76	Jul 92.76	Aug 92.76	or hot w Sep 92.76	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 92.76 Lighting gains	ains (see ns (Table Feb 92.76 s (calcula	Table 5 2 Table 5 2 Table 5 3 Mar 92.76 ted in Ap	of (65)m 5 and 5a ts Apr 92.76 opendix 7.89	May 92.76 L, equati 5.89	Jun 92.76 ion L9 o	Jul 92.76 r L9a), a	Aug 92.76 Iso see	Sep 92.76 Table 5 9.38	Oct 92.76	Nov 92.76	Dec 92.76	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42	ns (Table Feb 92.76 (calcula 12.81	Table 5 2 Table 5 2 Table 5 3 Mar 92.76 ted in Ap	of (65)m 5 and 5a ts Apr 92.76 opendix 7.89	May 92.76 L, equati 5.89	Jun 92.76 ion L9 o	Jul 92.76 r L9a), a	Aug 92.76 Iso see	Sep 92.76 Table 5 9.38	Oct 92.76	Nov 92.76	Dec 92.76	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga	res (Table Feb 92.76 (calcula 12.81 tins (calcula 163.43	Culation (control of the control of	of (65)m 5 and 5a ts Apr 92.76 opendix 7.89 Appendix	only if c May 92.76 L, equati 5.89 dix L, eq 138.83	Jun 92.76 ion L9 of 4.98 uation L	Jul 92.76 r L9a), a 5.38 13 or L1	Aug 92.76 Iso see 6.99 3a), also	Sep 92.76 Table 5 9.38 see Ta 123.56	Oct 92.76 11.91 ble 5 132.57	Nov 92.76	Dec 92.76	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76	res (Table Feb 92.76 (calcula 12.81 tins (calcula 163.43	Culation (control of the control of	of (65)m 5 and 5a ts Apr 92.76 opendix 7.89 Appendix	only if c May 92.76 L, equati 5.89 dix L, eq 138.83	Jun 92.76 ion L9 of 4.98 uation L	Jul 92.76 r L9a), a 5.38 13 or L1	Aug 92.76 Iso see 6.99 3a), also	Sep 92.76 Table 5 9.38 see Ta 123.56	Oct 92.76 11.91 ble 5 132.57	Nov 92.76	Dec 92.76	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains	res (Table Feb 92.76 (calcula 12.81 lins (calcula 163.43 s (calcula 32.28	Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 atted in A 32.28	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28	May 92.76 L, equati 5.89 dix L, equat 138.83 L, equat	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a)	Aug 92.76 Iso see 6.99 3a), also 119.33	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table	Oct 92.76 11.91 ble 5 132.57	Nov 92.76 13.9	Dec 92.76	eating	(66) (67) (68)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28	res (Table Feb 92.76 (calcula 12.81 lins (calcula 163.43 s (calcula 32.28	Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 atted in A 32.28	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28	May 92.76 L, equati 5.89 dix L, equat 138.83 L, equat	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a)	Aug 92.76 Iso see 6.99 3a), also 119.33	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table	Oct 92.76 11.91 ble 5 132.57	Nov 92.76 13.9	Dec 92.76	eating	(66) (67) (68)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa	reb 92.76 (calcula 12.81 ains (calcula 32.28 ans gains 3	mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Appendix 150.2 ppendix 32.28 5a) 3	only if construction only if construction only if construction on the construction of the construction on the construction of	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 3	reb 92.76 (calcula 12.81 ains (calcula 32.28 ans gains 3	mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5	of (65)m ts Apr 92.76 ppendix 7.89 150.2 ppendix 32.28 5a) 3	only if construction only if construction only if construction on the construction of the construction on the construction of	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 3 Losses e.g. e	res (Table Feb 92.76 (Calcula 12.81 ains (calcula 32.28 as gains 3 vaporatio -74.21	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5 3 on (negation of the Table 5 3) -74.21	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28 5a) 3 tive value	only if construction only if c	Jun 92.76 ion L9 o 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33 , also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94 32.28	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 3 Losses e.g. e (71)m= -74.21	res (Table Feb 92.76 (Calcula 12.81 ains (calcula 32.28 as gains 3 vaporatio -74.21	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5 3 on (negation of the Table 5 3) -74.21	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28 5a) 3 tive value	only if construction only if c	Jun 92.76 ion L9 o 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33 , also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94 32.28	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 3 Losses e.g. e (71)m= -74.21 Water heating	res (Table Feb 92.76 (calcula 12.81 hins (calcula 32.28 hrs gains 3 vaporatio 9.45	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 cuted in A 32.28 (Table 5 3 on (negation of the Table 5) 65.16	of (65)m ts Apr 92.76 ppendix 7.89 150.2 ppendix 32.28 5a) 3 tive valu -74.21	only if construction only if c	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28 3 le 5) -74.21	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33 , also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28 3 -74.21	Oct 92.76 11.91 ole 5 132.57 5 32.28 3 -74.21	Nov 92.76 13.9 143.94 32.28 3 -74.21	Dec 92.76 14.82 154.62 32.28 3 -74.21	eating	(66) (67) (68) (69) (70) (71)
Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 3 Losses e.g. e (71)m= -74.21 Water heating (72)m= 71.8	res (Table Feb 92.76 (calcula 12.81 hins (calcula 32.28 hrs gains 3 vaporatio 9.45	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 cuted in A 32.28 (Table 5 3 on (negation of the Table 5) 65.16	of (65)m ts Apr 92.76 ppendix 7.89 150.2 ppendix 32.28 5a) 3 tive valu -74.21	only if construction only if c	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28 3 le 5) -74.21	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33 , also se 32.28	Sep 92.76 Table 5 9.38 see Ta 123.56 ee Table 32.28 3 -74.21	Oct 92.76 11.91 ole 5 132.57 5 32.28 3 -74.21	Nov 92.76 13.9 143.94 32.28 3 -74.21	Dec 92.76 14.82 154.62 32.28 3 -74.21	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Fac Table 6d	ctor	Area m²		Flu Tal	x ble 6a		g_ Table 6b		FF Table 6c			Gains (W)	
Northeast 0.9x 0.77	x	7.15	×	1	1.28	x	0.24	x	0.7		= [18.78	(75)
Northeast 0.9x 0.77	X	7.15	x	2	22.97	x	0.24	x	0.7		= [38.24	(75)
Northeast 0.9x 0.77	X	7.15	X	4	1.38	x	0.24	x	0.7		= [68.89	(75)
Northeast 0.9x 0.77	x	7.15	x	6	7.96	x	0.24	x	0.7		= [113.14	(75)
Northeast 0.9x 0.77	x	7.15	x	9	1.35	x	0.24	x	0.7		= [152.08	(75)
Northeast 0.9x 0.77	X	7.15	X	9	7.38	X	0.24	x	0.7		= [162.13	(75)
Northeast 0.9x 0.77	x	7.15	x		91.1	x	0.24	x	0.7		= [151.67	(75)
Northeast 0.9x 0.77	x	7.15	x	7	2.63	x	0.24	x	0.7		= [120.91	(75)
Northeast 0.9x 0.77	X	7.15	x	5	50.42	x	0.24	x	0.7		= [83.94	(75)
Northeast 0.9x 0.77	X	7.15	X	2	28.07	x	0.24	x	0.7		= [46.73	(75)
Northeast 0.9x 0.77	X	7.15	x		14.2	x	0.24	x	0.7		= [23.64	(75)
Northeast 0.9x 0.77	x	7.15	x		9.21	x	0.24	x	0.7	一	= [15.34	(75)
Southwest _{0.9x} 0.77	x	2.19	x	3	36.79	Ī	0.24	x	0.7		= [9.38	(79)
Southwest _{0.9x} 0.77	x	0.75	x	3	36.79	j	0.24	x	0.7		= [3.21	(79)
Southwest _{0.9x} 0.77	x	2.19	x	6	32.67	j	0.24	×	0.7		- [15.98	(79)
Southwest _{0.9x} 0.77	x	0.75	x	6	62.67	j	0.24	x	0.7		= [5.47	(79)
Southwest _{0.9x} 0.77	x	2.19	x	8	35.75	j	0.24	x	0.7		- [21.86	(79)
Southwest _{0.9x} 0.77	x	0.75	x	8	35.75	j	0.24	×	0.7		- [7.49	(79)
Southwest _{0.9x} 0.77	x	2.19	×	1	06.25	j	0.24	×	0.7	T	= [27.09	(79)
Southwest _{0.9x} 0.77	×	0.75	×	1	06.25	ĺ	0.24	×	0.7	一	= [9.28	(79)
Southwest _{0.9x} 0.77	×	2.19	×	1	19.01	i	0.24	= x	0.7	一	_ [30.34	(79)
Southwest _{0.9x} 0.77	x	0.75	×	1	19.01	Ī	0.24	×	0.7		<u> </u>	10.39	(79)
Southwest _{0.9x} 0.77	×	2.19	×	1	18.15	i	0.24	×	0.7	一	= [30.12	(79)
Southwest _{0.9x} 0.77	x	0.75	×	1	18.15	j	0.24	= x	0.7	一	_ [10.32	(79)
Southwest _{0.9x} 0.77	x	2.19	×	1	13.91	j	0.24	×	0.7	一	= [29.04	(79)
Southwest _{0.9x} 0.77	×	0.75	×	1	13.91	ĺ	0.24	×	0.7	一	= [9.95	(79)
Southwest _{0.9x} 0.77	×	2.19	×	1	04.39	j	0.24	x	0.7	\equiv	= [26.62	(79)
Southwest _{0.9x} 0.77	x	0.75	×	1	04.39	j	0.24	×	0.7	一	= [9.12	(79)
Southwest _{0.9x} 0.77	x	2.19	×		92.85	ĺ	0.24	×	0.7	一	<u> </u>	23.67	(79)
Southwest _{0.9x} 0.77	×	0.75	×		92.85	i	0.24	= x	0.7		_ [8.11	(79)
Southwest _{0.9x} 0.77	x	2.19	×		9.27	j	0.24	×	0.7		_ [17.66	(79)
Southwest _{0.9x} 0.77	×	0.75	×		9.27	j	0.24	x	0.7		_ [6.05	(79)
Southwest _{0.9x} 0.77	×	2.19	×		4.07	ĺ	0.24	×	0.7		_ [11.24	(79)
Southwest _{0.9x} 0.77	x	0.75	x		4.07	<u> </u>	0.24	x	0.7	_	_ [3.85	(79)
Southwest _{0.9x} 0.77	×	2.19	×		31.49	1	0.24	x	0.7	\equiv	_ [8.03	(79)
Southwest _{0.9x} 0.77	×	0.75	×		31.49]	0.24	x	0.7	\dashv	_ [2.75	(79)
						J	0.21				L		_ '` ′
Solar gains in watts, calc	ulated 98.24			202 57	190.66		n = Sum(74)m	T	20 70	26.4	$\overline{}$		(83)
(83)m= 31.38 59.69 5 Total gains – internal and				202.57 (83)m		156	.65 115.73	70.44	38.72	26.1			(03)
	86.85	` 	7.04	440	417.38	388	.92 356.96	329.03	317.17	319.3	38		(84)
(3.7)	30.00	120.04		. 10	L	1 555	.52 550.55	1 323.00	1 317.17	1 313.0			()

7. Me	an inter	nal temp	perature	(heating	season)								
				eriods ir		<i>'</i>	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for a	ains for	living are	ea. h1.m	(see Ta	ble 9a)		` ,					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	1	0.99	0.98	0.95	0.87	0.74	0.79	0.94	0.99	1	1		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	' in Tabl	e 9c)					
(87)m=	19.34	19.46	19.71	20.09	20.47	20.78	20.92	20.9	20.64	20.17	19.69	19.31		(87)
	erature	durina h	L eating r	eriods ir	n rest of	dwelling	from Ta	hle 0 T	h2 (°C)	l	l .			
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
l Itilies	etion fac	tor for a	ains for	rest of d	welling	h2 m (se	e Tahle	9a)		<u> </u>	<u> </u>			
(89)m=	1	1	0.99	0.98	0.92	0.78	0.57	0.64	0.89	0.98	0.99	1		(89)
					<u>l</u>	<u>l</u>		<u> </u>		<u>l</u>	0.00	<u> </u>		(==)
			1	the rest	r	- ` `		i 			1	1		(00)
(90)m=	17.51	17.69	18.07	18.61	19.16	19.56	19.69	19.68	19.4	18.74	18.04	17.49		(90) —
									1	fLA = Livin	g area ÷ (4	4) =	0.26	(91)
Mean	interna	l temper	ature (fc	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	17.98	18.15	18.49	18.99	19.49	19.88	20.01	19.99	19.72	19.1	18.47	17.95		(92)
Apply	adjustn	nent to t	he mear	interna	l temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	17.83	18	18.34	18.84	19.34	19.73	19.86	19.84	19.57	18.95	18.32	17.8		(93)
	ace hea	tina rea	uirement		l	l .				l .				
					re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	ulate	
				using Ta					,	(,			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	. <u></u> 1:						•	•			
(94)m=	1	0.99	0.99	0.97	0.91	0.78	0.59	0.65	0.88	0.97	0.99	1		(94)
Usefu	ıl gains,	hmGm	, W = (9	4)m x (8	4)m	!				!	!			
(95)m=	331.57	356.64	381.65	407.18	408.16	343.76	247.44	253.86	315.11	320.55	314.62	318.09		(95)
Month	nly avera	age exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for me	an intern	nal tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	 1				
(97)m=	1115.35		972.55	809.74	621.54	413.22	262.82	276.99	442.45	679.24	915.17	1113.81		(97)
Space	e heatin	a reauire	ement fo	r each n	nonth. k\	Mh/mont	th = 0.02	24 x [(97)m – (95)ml x (4	1)m			
(98)m=	583.13	484.55	439.63	289.84	158.76	0	0	0	0	266.87	432.39	592.01		
, ,					<u> </u>	<u> </u>		I Tota	l ner vear	l (kWh/year		8), 50 40 =	3247.18	(98)
_					.,			1010	i poi youi	(KVVIII) y Cal) = Gain(G	0)15,912		믘
•		• .		kWh/m²	² /year								58.39	(99)
8c. S	pace co	oling red	quiremer	nt										
Calcu	lated fo			August.		ole 10b	1	1						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		· ` ·		r	T					r i	T	able 10)		
(100)m=		0	0	0	0	757.83	596.59	611.66	0	0	0	0		(100)
		tor for lo	r		·	·						, ,		
(101)m=	0	0	0	0	0	0.68	0.77	0.73	0	0	0	0		(101)

Useful loss, hmLr		 			1	1		<u> </u>				(100)
(102)m= 0 (0	0	518.44	460.63	448.62	0	0	0	0		(102)
Gains (solar gains			0	576.05	548.51	515.89	0	0	0	0		(103)
Space cooling red				ļ							((41)m	(100)
set (104)m to zero				woming,	COMMINA	ouo (nr	11) – 0.0	2 / X [(/ C	(,02),,,,,,,	((1) / / /	
(104)m = 0	0	0	0	0	65.38	50.05	0	0	0	0		
								= Sum(,	=	115.43	(104)
Cooled fraction	/T-bl- 40	- \					f C =	cooled	area ÷ (4	1) =	0.68	(105)
Intermittency facto	 	0	0	0.25	0.25	0.25	0	0	0	0		
(100)111= 0 (1 "		0.23	0.23	0.23		 = Sum(=	0	(106)
Space cooling requ	irement for	month =	= (104)m	× (105)	× (106)r	m	TOla	ı = Sum	1 <u>0.4</u>)	=	0	(100)
(107)m = 0	1	0	0	0	11.17	8.55	0	0	0	0		
	I	1		l	<u>!</u>	<u>!</u>	Tota	= Sum(107)	=	19.72	(107)
Space cooling requ	irement in	kWh/m²/	year				(107)) ÷ (4) =		ļ	0.35	(108)
9a. Energy require	ments – Inc	dividual h	eating s	vstems i	ncluding	ı micro-C	CHP)	. ,				
Space heating:			<i>J</i> .	,			,					
Fraction of space	heat from s	secondar	y/supple	mentary	system						0	(201)
Fraction of space	heat from r	main syst	tem(s)			(202) = 1	- (201) =			İ	1	(202)
Fraction of total h	eating from	main sy	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of main	space hea	ting syste	em 1								89.5	(206)
Efficiency of seco	ndary/supp	lementar	v heating	g systen	า, %					ļ	0	(208)
•	, ,,		•									
Cooling System F	neray Effic	iencv Ra	tio								4 73	(209)
Cooling System E		· ·	1	lun.		l Aug	Con	Oct	Nov	Doo	4.73	(209)
Jan F	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	4.73 kWh/ye	`
	eb Mar Juirement (Apr	May			Aug 0	Sep 0	Oct 266.87	Nov 432.39	Dec 592.01		`
Jan F Space heating reception 583.13 484	eb Mar Juirement (55 439.63	Apr calculate	May d above)	Jul				I			⊒` ´
Jan F Space heating re-	eb Mar juirement (55 439.63 (204)] } x	Apr calculate	May d above)	Jul				I			`
Jan F Space heating red 583.13 484 (211)m = {[(98)m x)	eb Mar juirement (55 439.63 (204)] } x	Apr calculate 289.84 100 ÷ (20	May d above 158.76	0	Jul 0	0	0	266.87 298.18	432.39	592.01 661.46		⊒` ´
Jan F Space heating red 583.13 484 (211)m = {[(98)m x) 651.54 54	eb Mar juirement (55 439.63 (204)] } x .4 491.21	Apr calculate 289.84 100 ÷ (20 323.85	May d above 158.76 06) 177.38	0	Jul 0	0	0	266.87 298.18	432.39	592.01 661.46	kWh/ye	(211)
Jan F Space heating red 583.13 484 (211)m = {[(98)m x)	b Mar juirement (155 439.63 (204)] } x .4 491.21	Apr calculate 289.84 100 ÷ (20 323.85	May d above 158.76 06) 177.38	0	Jul 0	0	0	266.87 298.18	432.39	592.01 661.46	kWh/ye	(211)
Jan F Space heating rec 583.13 484 (211)m = {[(98)m x) 651.54 54 Space heating fue	eb Mar juirement (155 439.63 (204)] } x .4 491.21 el (seconda x 100 ÷ (20	Apr calculate 289.84 100 ÷ (20 323.85	May d above 158.76 06) 177.38	0	Jul 0	0	0	266.87 298.18	432.39	592.01 661.46	kWh/ye	(211)
Jan F Space heating ref 583.13 484 (211)m = {[(98)m x 651.54 54} Space heating fue = {[(98)m x (201)] }	eb Mar juirement (155 439.63 (204)] } x .4 491.21 el (seconda x 100 ÷ (20	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/	May d above 158.76 06) 177.38	0	Jul 0	0 Tota	0 0 (kWh/yea	266.87 298.18 298.18 0	432.39 483.12 211) _{15,1012}	592.01 661.46 =	kWh/ye	(211)
Jan F Space heating ref 583.13 484 (211)m = {[(98)m x 651.54 54} Space heating fue = {[(98)m x (201)]}	eb Mar juirement (155 439.63 (204)] } x .4 491.21 el (seconda x 100 ÷ (20	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/	May d above 158.76 06) 177.38	0	Jul 0	0 Tota	0 0 (kWh/yea	266.87 298.18 298.18 0	432.39 483.12 211) _{15,1012}	592.01 661.46 =	kWh/ye	(211) (211)
Jan F Space heating received [583.13] 484 (211)m = {[(98)m x 651.54] 54} Space heating fue = {[(98)m x (201)] (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	b Mar juirement (155 439.63 (204)] } x .4 491.21 If (seconda x 100 ÷ (20 0	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0	May d above 158.76 D6) 177.38 /month 0	0 0	Jul 0 0	0 Tota	0 0 I (kWh/yea	266.87 298.18 ar) =Sum(2 0 ar) =Sum(2	432.39 483.12 211) _{15,1012} 0 215) _{15,1012}	592.01	kWh/ye	(211) (211)
Jan F Space heating rec 583.13 484 (211)m = {[(98)m x 651.54 54} Space heating fue = {[(98)m x (201)]] (215)m= 0 Water heating Output from water 171.53 148	b Mar puirement (155 439.63 (204)] } x .4 491.21 If (seconda x 100 ÷ (20 0	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08)	May d above 158.76 (76) 177.38 (76) (77)	0	Jul 0	0 Tota	0 0 (kWh/yea	266.87 298.18 298.18 0	432.39 483.12 211) _{15,1012}	592.01 661.46 =	3628.14 0	(211) (211) (215)
Jan F Space heating received [583.13] 484 (211)m = {[(98)m x 651.54] 54} Space heating fue = {[(98)m x (201)]} (215)m = 0 Water heating Output from water 171.53 148 Efficiency of water	b Mar uirement (1) 55 439.63 (204)] } x .4 491.21 d (seconda x 100 ÷ (20) 0 0 neater (calconda 84 155.9 heater	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27	May d above; 158.76 (26) 177.38 (70) (70) (70) (70) (70) (70) (70) (70)	0 0	Jul 0 0 0 112.97	0 Tota 0 Tota 125.93	0 0 I (kWh/yea	298.18 298.18 0 0 ar) =Sum(2 144.98	432.39 483.12 211) _{15,1012} 0 215) _{15,1012}	592.01 661.46 = 0 =	kWh/ye	(211) (211) (215)
Jan F Space heating received from the second	b Mar puirement (1) 55 439.63 (204)] } x .4 491.21 If (seconda x 100 ÷ (20	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27	May d above 158.76 D6) 177.38 /month 0	0 0	Jul 0 0	0 Tota	0 0 I (kWh/yea	266.87 298.18 ar) =Sum(2 0 ar) =Sum(2	432.39 483.12 211) _{15,1012} 0 215) _{15,1012}	592.01	3628.14 0	(211) (211) (215)
Jan F Space heating received from the second	b Mar puirement (155 439.63 (204)] } x	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5	May d above; 158.76 (26) 177.38 (70) (70) (70) (70) (70) (70) (70) (70)	0 0	Jul 0 0 0 112.97	0 Tota 0 Tota 125.93	0 0 (kWh/yea	298.18 298.18 0 0 ar) =Sum(2 144.98	432.39 483.12 211) _{15,1012} 0 215) _{15,1012}	592.01 661.46 = 0 =	3628.14 0	(211) (211) (215)
Jan F Space heating received from the second	b Mar puirement (1) 55 439.63 (204)] } x .4 491.21 I (seconda x 100 ÷ (2)	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5	May d above; 158.76 (26) 177.38 (70) (70) (70) (70) (70) (70) (70) (70)	0 0	Jul 0 0 0 112.97	0 Tota 0 Tota 125.93	0 0 (kWh/yea	298.18 298.18 0 0 ar) =Sum(2 144.98	432.39 483.12 211) _{15,1012} 0 215) _{15,1012}	592.01 661.46 = 0 =	3628.14 0	(211) (211) (215)
Jan F Space heating rec 583.13 484 (211)m = {[(98)m x 651.54 54} Space heating fue = {[(98)m x (201)]} (215)m= 0 Water heating Output from water 171.53 149 Efficiency of water (217)m= 89.5 89 Fuel for water head (219)m = (64)m x	b Mar puirement (1) 55 439.63 (204)] } x .4 491.21 I (seconda x 100 ÷ (2)	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5 conth	May d above; 158.76 06) 177.38 /month 0 bove) 133.87	0 0 0 117.91 89.5	Jul 0 0 0 112.97 89.5	0 Tota 125.93 89.5	0 0 0 1 (kWh/yea 127.32	298.18 ar) =Sum(2 0 144.98 89.5	432.39 483.12 211) _{15,1012} 0 215) _{15,1012} 154.76	592.01 661.46 0 167.51 89.5	3628.14 0	(211) (211) (215)
Jan F Space heating rec 583.13 484 (211)m = {[(98)m x 651.54 54] Space heating fue = {[(98)m x (201)] } (215)m = 0 Water heating Output from water 171.53 149 Efficiency of water (217)m = 89.5 89 Fuel for water heat (219)m = (64)m x (219)m = 191.66 167 Space cooling fue	b Mar puirement (1) 55 439.63 (204)] } x .4 491.21 If (seconda x 100 ÷ (204) 0 heater (calca 155.9) heater 5 89.5 heater 100 ÷ (217) 42 174.19	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5 conth c)m 154.5	May d above; 158.76 06) 177.38 /month 0 bove) 133.87	0 0 0 117.91 89.5	Jul 0 0 0 112.97 89.5	0 Tota 125.93 89.5	0 0 0 1 (kWh/yea 127.32 89.5	298.18 ar) =Sum(2 0 144.98 89.5	432.39 483.12 211) _{15,1012} 0 215) _{15,1012} 154.76	592.01 661.46 0 167.51 89.5	3628.14 0	(211) (211) (215) (216) (217)
Jan F Space heating received from the second r	b Mar puirement (155 439.63 (204)] } x	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5 nonth)m 154.5	May d above 158.76 06) 177.38 /month 0 bove) 133.87 89.5	0 0 0 117.91 89.5	Jul 0 0 0 112.97 89.5	0 Tota 125.93 89.5	0 0 0 1 (kWh/yea 127.32 89.5 142.26 1 = Sum(2	298.18 298.18 0 ar) =Sum(2 144.98 89.5 161.99 19a) ₁₁₂ =	432.39 483.12 211) _{15,1012} 0 215) _{15,1012} 154.76 89.5	592.01 661.46 0 167.51 89.5	3628.14 0	(211) (211) (215) (216) (217)
Jan F Space heating rec 583.13 484 (211)m = {[(98)m x 651.54 54] Space heating fue = {[(98)m x (201)]] (215)m = 0 Water heating Output from water 171.53 149 Efficiency of water (217)m = 89.5 89 Fuel for water heat (219)m = (64)m x (219)m = 191.66 167 Space cooling fue	b Mar puirement (155 439.63 (204)] } x .4 491.21 I (seconda x 100 ÷ (204) 0 heater (calca	Apr calculate 289.84 100 ÷ (20 323.85 ry), kWh/ 08) 0 culated a 138.27 89.5 conth c)m 154.5	May d above; 158.76 06) 177.38 /month 0 bove) 133.87	0 0 0 117.91 89.5	Jul 0 0 0 112.97 89.5	0 Tota 125.93 89.5 140.7 Tota	0 0 0 1 (kWh/yea 127.32 89.5	298.18 298.18 0 0 144.98 89.5 161.99 19a) ₁₁₂ =	432.39 483.12 211) _{15,1012} 0 215) _{15,1012} 154.76	592.01 661.46 0 167.51 89.5	3628.14 0	(211) (211) (215) (216) (217)

Annual totals		kWh/yea	r	kWh/year	¬
Space heating fuel used, main system 1				3628.14	╛
Water heating fuel used				1900.33	
Space cooling fuel used				4.17	
Electricity for pumps, fans and electric keep-hot					
mechanical ventilation - balanced, extract or pos	itive input from outside		92.61]	(230a)
central heating pump:			30		(230c)
Total electricity for the above, kWh/year	sum of	(230a)(230g) =		122.61	(231)
Electricity for lighting				254.67	(232)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh	ctor	Emissions kg CO2/yea	
Space heating (main system 1)	U		etor =		
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh		kg CO2/yea	ar ¬
	kWh/year	kg CO2/kWh	=	kg CO2/yea	ar](261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/yea	(261) (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	kg CO2/yea 783.68 0 410.47	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264)	kg CO2/kWh 0.216 0.519 0.216	= = =	kg CO2/yea 783.68 0 410.47 1194.15	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Space cooling	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) (221) x	kg CO2/kWh 0.216 0.519 0.216 0.519	= = =	kg CO2/yea 783.68 0 410.47 1194.15 2.17	(261) (263) (264) (265) (266)
Space heating (secondary) Water heating Space and water heating Space cooling Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) (221) x (231) x	kg CO2/kWh 0.216 0.519 0.216 0.519 0.519	= = = = =	kg CO2/yea 783.68 0 410.47 1194.15 2.17 63.63	(261) (263) (264) (265) (266) (266)

El rating (section 14)

81

(274)

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 20	012			a Num are Vei				016363 on: 1.0.4.10	
		Р	roperty	Address	: Flat 0-1	I-Clean				
Address :										
1. Overall dwelling dime	nsions:		Δ	- (2\		Av. Ha	: au la 4 / ma \		Valuma/m³	,
Basement				a(m²) 13.25	(1a) x		ight(m) 3.1	(2a) =	Volume(m³	(3a)
Ground floor				3.89	(1b) x	2	2.6](2b) =	166.11	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	n) 1	07.14	(4)			J		
Dwelling volume			´ <u></u>)+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	r
Number of chimneys	0 +	0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent far	าร					0	x .	10 =	0	(7a)
Number of passive vents						0	x	10 =	0	(7b)
Number of flueless gas fin	res				Ī	0	X 4	40 =	0	(7c)
								Air ob	anges per ho	
Infiltration due to chimney	vs. fluos and fans –	(6a)+(6b)+(7	/a)ェ(7h)ェ(7c) -	Г			1		_
If a pressurisation test has be	·				continue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in th	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timbe	er frame or	0.35 fo	r mason	ry constr	uction			0	(11)
if both types of wall are pr		esponding to	the great	ter wall are	a (after			'		
deducting areas of opening		aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	•	,	(,,					0	(13)
Percentage of windows	and doors draught	stripped							0	(14)
Window infiltration	_			0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in c	ubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabili	ty value, then (18) =	[(17) ÷ 20]+(8	B), otherw	ise (18) =	(16)				0.15	(18)
Air permeability value applies	s if a pressurisation test l	nas been dor	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	d								2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporati	ing shelter factor			(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind spe	ed	1		1				•	
Jan Feb	Mar Apr Ma	y Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m =	: (22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration ra	te (allowi	na for sh	nelter an	d wind s	need) =	(21a) x	(22a)m	•	•			
0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective air	1	rate for t										
If mechanical ventil											0.5	(23a)
If exhaust air heat pump	•	,	, ,	,	. ,	,,	,) = (23a)		l	0.5	(23b)
If balanced with heat rec	-	•	_								76.5	(23c)
a) If balanced mech	1				- `		``	- ^ `		r ` ´	÷ 100]	(5.4.)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mech						- ` ` - 	``	 	- 		l	(0.41.)
(24b)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house ex			-	-				5 v (22h	.\			
if $(22b)m < 0.5$ (24c)m= 0 0	x (230), t	nen (240	(230) = (230)	o), otherv	0	C) = (220)	0	.5 × (23L	0	0		(24c)
d) If natural ventilat										0		(210)
if (22b)m = 1, th								0.5]				
(24d)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change	rate - er	iter (24a	or (24b	o) or (240	c) or (24	d) in box	(25)	•			l	
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
											•	
Heat losses and h	eat loss r	paramete	er:									
3. Heat losses and h ELEMENT Gro area	·	oaramete Openin m	gs	Net Ard		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²·ł		A X k kJ/K
ELEMENT Gro	SS	Openin	gs						<) 			
ELEMENT Groarea	SS	Openin	gs	A ,n	m² x	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Groarea	SS	Openin	gs	A ,n	m ² x	W/m2	= 0.04] =	(W/I	<) 			kJ/K (26)
ELEMENT Groarea Doors Windows Type 1	SS	Openin	gs	A ,n	m ² x x1/	W/m2 1.2 /[1/(1.2)+	0.04] = 0.04] =	(W/I 3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Groares Doors Windows Type 1 Windows Type 2	SS	Openin	gs	A ,n 2.6 13.52 2.73	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13	<) 			kJ/K (26) (27) (27)
ELEMENT Groares Doors Windows Type 1 Windows Type 2 Windows Type 3	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Groares Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	SS	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54 3.51	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	ss a (m²)	Openin	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575				(26) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	ss a (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Type2 Walls Type2	ss a (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 43	32 68	34.00 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	x1/2 x1/2 x1/3 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type4	32 68 .4	34.00 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22	x1/2 x1/2 x1/3 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.2	32 68 .4 22	34.00 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 77. Walls Type2 20. Walls Type3 43 Walls Type4 28. Roof Type1 11.	32 68 .4 22 42	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.2 /[1/(1.2)+ /[1/(1.	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94 1.71				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Cancel Company Com	32 68 .4 22 27 42	34.00 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42 4.83	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 77. Walls Type2 20. Walls Type3 43 Walls Type4 28. Roof Type1 11.	32 68 .4 22 27 42	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94 1.71				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)

Party of	eilina					59.06					Г			(32b)
-	•	roof wind	ows, use e	ffective wi	ndow U-va			formula 1	/[(1/U-valu	e)+0.04] a	L as given in	paragraph		(326)
			sides of in		ls and part	titions		(00) (00)	. (00)			r		_
			= S (A x	U)				(26)(30)	, ,	(00) (0)	a) (00)	(00.)	71.12	(33)
		Cm = S(TE 4) :				., ,	, , ,	2) + (32a)	(32e) = [34247.85	(34)
		•	ter (TMF		•			o o io o ly 4h c		tive Value		blo 1f	250	(35)
	•		ere tne de tailed calci		constructi	ion are not	r known pr	ecisely the	indicative	values of	TMP in Ta	able 11		
Therm	al bridge	es : S (L	x Y) cal	culated i	using Ap	pendix ł	<						36.66	(36)
if details	of therma	ıl bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea		alculated	l monthly	y	i		i		= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		_
Heat lo	oss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	133.24	(39)
(40)m=	1.26	1.26	1.26	1.24	1.24	1.23	1.23	1.22	1.23	1.24	1.25	1.25		
									/	Average =	Sum(40) ₁ .	12 /12=	1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)	r	r		r			1	· · · · · ·		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m =	31	28	31	30	31	20								(41)
			01	30	31	30	31	31	30	31	30	31		(· ·)
			01	30	31	30	31	31	30	31	30	31		(,
4. Wa	iter heat		rgy requi			30	31	31	30	31	30	kWh/ye	ear:	()
			rgy requi			30	31	31	30	31			ar:	
Assum if TF	ied occu A > 13.9	ing ener	rgy requi	rement:							2	kWh/ye	ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ing ener pancy, I 9, N = 1 9, N = 1	rgy requi N + 1.76 x	rement:	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (T		9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ing energipancy, I D, N = 1 D, N = 1 e hot wa	rgy requi	rement: [1 - exp	(-0.0003	349 x (TF	FA -13.9) erage =)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ing energy, I pancy, I 9, N = 1 9, N = 1 e hot was al average	rgy requi N + 1.76 x	rement: [1 - exp ge in litre usage by:	(-0.0003 es per da 5% if the a	349 x (TF ay Vd,av	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ar:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by a day (all w	(-0.0003 es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by a day (all w Apr ach month	(-0.0003 es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by a day (all w	(-0.0003 es per da 5% if the d vater use, I	349 x (TF ay Vd,av lwelling is hot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	[1 - exp ge in litre usage by a day (all w Apr ach month	(-0.0003 es per da 5% if the of rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (7 + 36 a water us Sep	ΓFA -13. se target o Oct 102.63 Fotal = Su	9) 100 Nov 106.65 m(44) ₁₁₂ =	kWh/ye .8 0.62 Dec 110.68	ear: 1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual of that 125 Jan er usage in	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy energy energy feb filtres per filtres per foliations folia	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea 102.63	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61	(-0.0003 es per da 5% if the o rater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	FFA -13. The target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of the target of target of target of the target of target	9) 100 106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68 c, 1d)		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	[1 - exp ge in litre usage by a day (all w Apr ach month	(-0.0003 es per da 5% if the of rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us Sep 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1. 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea 102.63	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 culated mo	(-0.0003 es per da 5% if the d vater use, I May Vd,m = fa 94.58 onthly = 4.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	FA -13.9) erage = designed to	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	9) 100 106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m=	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requiversely required to the second per	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 culated mo	(-0.0003 es per da 5% if the d vater use, I May Vd,m = fa 94.58 onthly = 4.	349 x (TF ay Vd,avellwelling is that and con Jun ctor from T 90.56	FA -13.9) erage = designed to	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1. 146.38	kWh/ye .8 0.62 Dec 110.68	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage	ing energy pancy, I pancy, I pancy, I pancy, I pancy p	rgy requi N + 1.76 x ater usag hot water person per Mar 102.63 used - calc 148.13	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 of use (no	(-0.0003 es per da 5% if the of rater use, I May Vd,m = fai 94.58 onthly = 4. 123.92 o hot water 18.59	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93	erage = designed to did) Jul Fable 1c x 90.56 n x nm x E 99.09 enter 0 in 14.86	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthal 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum	ing energy, Inpancy,	rgy requivalent of the second	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 of use (not 19.37	(-0.0003 es per da 5% if the d vater use, I May Vd,m = fa 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave lwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(42) (43) (44)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If comit	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy pancy, I pancy, I pancy, I pancy, I pancy parce p	rgy requi N + 1.76 x ater usag hot water person per Mar 102.63 used - calc 148.13	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 of use (not 19.37	(-0.0003 es per da 5% if the of rater use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Waterling, e	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instan (46)m= Water Storag If comit Othery	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy, Ipancy, Ip	rgy requively required to the second per sec	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 of use (not 19.37	(-0.0003 es per da 5% if the of rater use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Waterling, e	349 x (TF ay Vd,ave lwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110	erage = designed to did) Jul Fable 1c x 90.56 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity he wise if no storage	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy energy Feb palitres per 106.65 hot water 143.55 ater heatin 21.53 loss: e (litres) eating a pater stored loss:	rgy requively required to the second per sec	[1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 of use (not 19.37 ag any so nk in dw er (this in	(-0.0003 es per da 5% if the a vater use, I May Vd,m = fa 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W velling, e	349 x (TF ay Vd,avelwelling is a not and con Jun ctor from T 90.56 190 x Vd,r 106.93 r storage), 16.04 /WHRS nter 110 nstantar	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) =$	110	(50)
b) If manufacturer's declared cylinder loss factor is not known	:		· I
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3		0.02	(51)
Volume factor from Table 2a		1.03	(52)
Temperature factor from Table 2b		0.6	(53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	1.03	(54)
Enter (50) or (54) in (55)		1.03	(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$		
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57) m = (56) m where $($	H11) is from Append	ix H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(57)
Primary circuit loss (annual) from Table 3		0	(58)
Primary circuit loss calculated for each month (59) m = $(58) \div 3$	365 × (41)m	L	I
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder thermo	stat)	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.26	22.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) \div 365 x (4	1)m	-	'
(61)m= 0 0 0 0 0 0 0	0 0 0	0 0	(61)
Total heat required for water heating calculated for each mont	$h (62)m = 0.85 \times (45)m +$	(46)m + (57)m +	(59)m + (61)m
(62)m= 219.41 193.48 203.41 182.64 179.2 160.43 154.37	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 	199.87 214.23	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quant) · · ·
(add additional lines if FGHRS and/or WWHRS applies, see A		ion to water neating)	
(63)m= 0 0 0 0 0 0 0 0	0 0 0	0 0	(63)
Output from water heater	<u> </u>	<u> </u>	
(64)m= 219.41 193.48 203.41 182.64 179.2 160.43 154.37	168.98 168.56 189.37	199.87 214.23	
	Output from water heate	I <u> </u>	2233.94 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m	1
(65)m= 98.8 87.67 93.48 85.74 85.42 78.35 77.17	82.03 81.05 88.81	91.47 97.07	(65)
include (57)m in calculation of (65)m only if cylinder is in the	1 1	om community h	l neating
5. Internal gains (see Table 5 and 5a):	awaiiing of flot water is in	om community i	
,			
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep Oct	Nov Dec	
(66)m= 139.83 139.83 139.83 139.83 139.83 139.83 139.83	 	139.83 139.83	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a),		100.00	()
(67)m= 23.84 21.17 17.22 13.04 9.74 8.23 8.89	11.55 15.51 19.69	22.98 24.5	(67)
Appliances gains (calculated in Appendix L, equation L13 or L	 	22.00	(,
(68)m= 267.38 270.16 263.16 248.28 229.49 211.83 200.03		237.92 255.58	(68)
` '		237.32 233.30	(33)
Cooking gains (calculated in Appendix L, equation L15 or L15 (69)m= 36.98 36.98 36.98 36.98 36.98 36.98 36.98	36.98 36.98 36.98	36.98 36.98	(69)
	30.90 30.90 30.90	30.98 30.98	(00)
Pumps and fans gains (Table 5a)			(70)
(70)m= 0 0 0 0 0 0 0 0	0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	144.00 444.00 444.00	444.00	(74)
(71)m= -111.86 -111.86 -111.86 -111.86 -111.86 -111.86 -111.86	6 -111.86 -111.86 -111.86	-111.86 -111.86	(71)

Water heatin	g gains (T	able 5)												
(72)m= 132.7	9 130.47	125.64	119.08	114.82	10	8.82	103.72	110	.25 112.57	119.3	7 127.03	130.48		(72)
Total interna	al gains =					(66)n	n + (67)m	+ (68	3)m + (69)m + ((70)m +	(71)m + (72)	m	•	
(73)m= 488.9	6 486.74	470.97	445.34	419	39	3.82	377.59	384	.01 397.28	423.1	4 452.89	475.51		(73)
6. Solar gai	ns:													
Solar gains are	e calculated	using sola	r flux from	Table 6a	and a	associa	ted equa	tions	to convert to th	e applio	able orientat	ion.		
Orientation:	Access F Table 6d		Area m²			Flux Tabl	e 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.54	Х	13.	52	x	11	.28	x	0.24	x	0.7	=	12.46	(75)
Northeast 0.9x	0.77	X	2.7	' 3	x [11	.28	x	0.24	×	0.7	=	3.59	(75)
Northeast 0.9x	0.77	X	4.1	6	x [11	.28	x	0.24	×	0.7	=	5.46	(75)
Northeast 0.9x	0.54	х	13.	52	x	22	.97	x	0.24	x	0.7	=	25.35	(75)
Northeast 0.9x	0.77	X	2.7	73	x	22	.97	x	0.24	x	0.7	=	7.3	(75)
Northeast 0.9x	0.77	X	4.1	6	x	22	.97	x	0.24	x	0.7	=	11.12	(75)
Northeast 0.9x	0.54	X	13.	52	x	41	.38	x	0.24	X	0.7	=	45.68	(75)
Northeast 0.9x	0.77	X	2.7	' 3	x	41	.38	x	0.24	X	0.7	=	13.15	(75)
Northeast 0.9x	0.77	X	4.1	6	x	41	.38	x	0.24	X	0.7	=	20.04	(75)
Northeast 0.9x	0.54	X	13.	52	x	67	.96	X	0.24	X	0.7	=	75.02	(75)
Northeast 0.9x	0.77	X	2.7	' 3	x	67	.96	X	0.24	X	0.7	=	21.6	(75)
Northeast 0.9x	0.77	X	4.1	6	x	67	.96	x	0.24	X	0.7	=	32.91	(75)
Northeast 0.9x	0.54	X	13.	52	x	91	.35	X	0.24	X	0.7	=	100.84	(75)
Northeast 0.9x	0.77	Х	2.7	' 3	x	91	.35	x	0.24	X	0.7	=	29.03	(75)
Northeast 0.9x	0.77	X	4.1	6	x	91	.35	x	0.24	X	0.7	=	44.24	(75)
Northeast 0.9x	0.54	X	13.	52	x	97	.38	X	0.24	X	0.7	=	107.5	(75)
Northeast 0.9x	0.77	Х	2.7	' 3	x	97	.38	x	0.24	X	0.7	=	30.95	(75)
Northeast 0.9x	0.77	X	4.1	6	x	97	.38	x	0.24	X	0.7	=	47.17	(75)
Northeast 0.9x	0.54	X	13.	52	x	91	1.1	x	0.24	X	0.7	=	100.56	(75)
Northeast 0.9x	0.77	Х	2.7	' 3	x	91	1.1	x	0.24	X	0.7	=	28.96	(75)
Northeast 0.9x	0.77	X	4.1	6	x	91	1.1	x	0.24	X	0.7	=	44.12	(75)
Northeast 0.9x	0.54	X	13.	52	x	72	.63	X	0.24	X	0.7	=	80.17	(75)
Northeast 0.9x	0.77	Х	2.7	' 3	x	72	.63	x	0.24	X	0.7	=	23.08	(75)
Northeast 0.9x	0.77	X	4.1	6	x	72	.63	x	0.24	X	0.7	=	35.17	(75)
Northeast 0.9x	0.54	X	13.	52	x	50	.42	x	0.24	X	0.7	=	55.66	(75)
Northeast 0.9x	0.77	Х	2.7	' 3	x	50	.42	x	0.24	X	0.7	=	16.03	(75)
Northeast 0.9x	0.77	X	4.1	6	x	50	.42	x	0.24	X	0.7	=	24.42	(75)
Northeast 0.9x	0.54	Х	13.	52	x	28	.07	x	0.24	X	0.7	=	30.98	(75)
Northeast 0.9x		X	2.7	' 3	x	28	.07	x	0.24	X	0.7	=	8.92	(75)
Northeast 0.9x	0.77	X	4.1	6	x	28	.07	x	0.24	X	0.7	=	13.59	(75)
Northeast 0.9x		Х	13.	52	x	14	1.2	x	0.24	x	0.7	=	15.67	(75)
Northeast 0.9x	0.77	X	2.7	73	x [14	1.2	X	0.24	X	0.7	=	4.51	(75)

Northeast _{0.9x}	0.77	x	4.1	6	хГ		14.2] _x		0.24	7 x [0.7	\neg	_ [6.88	(75)
Northeast _{0.9x}	0.54	x	13.		x [9.21]]		0.24		0.7	\dashv	_ [10.17	(75)
Northeast _{0.9x}	0.77	x	2.7		x [9.21) X	_	0.24		0.7	=	_ [2.93	(75)
Northeast _{0.9x}	0.77	x	4.1		x [9.21] x		0.24		0.7	一	_ [4.46	(75)
Southeast _{0.9x}	0.77	x	3.5	==	x [6.79]]		0.24		0.7	=	_ [15.04	(77)
Southeast 0.9x	0.77	x	3.5		x [2.67	X		0.24	x	0.7		_ -	25.61	(77)
Southeast 0.9x	0.77	x	3.5		x [5.75]]		0.24		0.7	一	_ [35.04	(77)
Southeast 0.9x	0.77	x	3.5		x [06.25]]		0.24	x	0.7	=	_ [43.42	(77)
Southeast 0.9x	0.77	X	3.5	51	x [1	19.01	X		0.24	x	0.7		=	48.63	(77)
Southeast 0.9x	0.77	x	3.5		x [18.15) x		0.24	x	0.7	_	=	48.28	(77)
Southeast 0.9x	0.77	X	3.5		x [13.91) X		0.24	_ x	0.7		=	46.55	(77)
Southeast 0.9x	0.77	X	3.5		x [04.39	X		0.24	x	0.7		=	42.66	(77)
Southeast 0.9x	0.77	x	3.5		x [2.85) X		0.24	x	0.7	=	= ¦	37.94	(77)
Southeast 0.9x	0.77	X	3.5		×		9.27	X	_	0.24	x	0.7	=	_ _	28.31	(77)
Southeast 0.9x	0.77	x	3.5		x [4.07) X		0.24		0.7	〓	_ [18.01	(77)
Southeast _{0.9x}	0.77	x	3.5		x [1.49]]		0.24		0.7	一	_ [12.87	(77)
Southwest _{0.9x}	0.77	x	7.5		x [6.79	<u>.</u>]		0.24	x	0.7	一	_ _	32.3	(79)
Southwest _{0.9x}	0.77	x	7.5		x [2.67	<u> </u> 		0.24	_	0.7		_ [55.02	(79)
Southwest _{0.9x}	0.77	x	7.5		x [5.75	<u> </u> 	_	0.24		0.7		_ [75.28	(79)
Southwest _{0.9x}	0.77	X	7.5		x [06.25]]	_	0.24	x	0.7	=	_ -	93.27	(79)
Southwest _{0.9x}	0.77	x	7.5		x [19.01	<u> </u> 		0.24	_	0.7		_ [104.47	(79)
Southwest _{0.9x}	0.77	x	7.5		x [18.15	<u> </u> 	_	0.24		0.7	_	_ [103.72	(79)
Southwest _{0.9x}	0.77	x	7.5		x [13.91	<u>.</u>]		0.24	x	0.7	=	_ _	99.99	(79)
Southwest _{0.9x}	0.77	x	7.5		x [04.39	<u> </u> 		0.24	_	0.7	一	_ [91.64	(79)
Southwest _{0.9x}	0.77	x	7.5		×		2.85]]		0.24	_	0.7	=	_ [81.51	(79)
Southwest _{0.9x}	0.77	x	7.5		x		9.27	,]	_	0.24	x	0.7		_ -	60.81	(79)
Southwest _{0.9x}	0.77	x	7.5		x [4.07	<u> </u> 		0.24	_	0.7	_	_ [38.69	(79)
Southwest _{0.9x}	0.77	x	7.5		x [1.49]]		0.24	_	0.7	=	_ [27.64	(79)
L					L			ı						ı		` ′
Solar gains in	watts, ca	lculated	for eacl	h month	1			(83)m	n = Sur	m(74)m	(82)m					
(83)m= 68.84	124.4	189.19	266.22	327.21	33	37.62	320.19	272	.73	215.56	142.61	83.76	58.0	7		(83)
Total gains – i	nternal a	nd solar	(84)m =	= (73)m	+ (8	33)m	, watts									
(84)m= 557.8	611.15	660.16	711.56	746.21	73	31.44	697.78	656	.74	612.84	565.75	536.64	533.5	58		(84)
7. Mean inter	nal temp	erature	(heating	seasor	า)											
Temperature	during h	eating p	eriods ir	the livi	ing a	area f	from Tab	ole 9	, Th1	(°C)					21	(85)
Utilisation fac	tor for ga	ains for I	iving are	ea, h1,n	n (se	e Ta	ble 9a)									
Jan	Feb	Mar	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	De	С		
(86)m= 1	1	1	0.99	0.96	0	.88	0.74	0.7	79	0.94	0.99	1	1			(86)
Mean interna	l tempera	ature in I	living are	ea T1 (f	ollov	w ste	ps 3 to 7	in T	able	9c)						
(87)m= 19.54	19.65	19.88	20.22	20.55	20	0.83	20.95	20.	93_	20.71	20.29	19.86	19.5	2		(87)
Temperature	during h	eating p	eriods ir	rest of	dwe	elling	from Ta	able 9	9, Th	 2 (°C)						
(88)m= 19.87	19.87	19.87	19.88	19.89	1	9.9	19.9	19	- 1	19.89	19.89	19.88	19.8	8		(88)
		!			-			•					•			

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	n2.m (se	ee Table	9a)						
(89)m=	1	1	0.99	0.98	0.94	0.81	0.6	0.66	0.9	0.99	1	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	le 9c)				
(90)m=	17.92	18.09	18.43	18.92	19.4	19.76	19.88	19.87	19.63	19.03	18.4	17.9		(90)
			ı						1	fLA = Livin	g area ÷ (4	1) =	0.15	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = f	LA × T1	+ (1 – fL	.A) × T2			<u> </u>		_
(92)m=	18.15	18.32	18.64	19.11	19.57	19.92	20.03	20.02	19.79	19.22	18.62	18.13		(92)
Apply	adjustn	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.15	18.32	18.64	19.11	19.57	19.92	20.03	20.02	19.79	19.22	18.62	18.13		(93)
8. Sp	ace hea	ting requ	uirement											
			ernal ter or gains			ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	<u> </u>	,		ļ		<u>'</u>	<u> </u>	ļ.			
(94)m=	1	1	0.99	0.98	0.93	0.81	0.62	0.67	0.9	0.98	1	1		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m=	556.42	608.62	654.5	695.26	695.66	590.73	429.55	441.82	550.66	555.4	534.2	532.52		(95)
	<u> </u>	<u> </u>	rnal tem				1	<u> </u>	ı					(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern 1637.87				=[(39)m : 451.17	x [(93)m 474.71	- (96)m 750.9	1146	1538.97	1870.88		(97)
. ,		l .					th = 0.02	l	l .			1070.00		(31)
(98)m=	982.84		731.62	479.36	260.93	0	0.02	0	0	439.41	723.43	995.74		
` '		ļ	<u> </u>				<u> </u>	<u> </u>	l per year	(kWh/year) = Sum(9	8) _{15,912} =	5423.71	(98)
Spac	e heatin	g require	ement in	kWh/m²	?/year						,		50.62] (99)
		• •	nts – Cor			scheme								_
					The state of the s		ater heat	tina prov	rided by	a comm	unitv sch	neme.		
		-				-	heating (• .	-		, ,		0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =					ĺ	1	(302)
The con	nmunity so	cheme ma	y obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and i	up to four	other heat	sources; tl	he latter	_
			-		aste heat f	rom powe	r stations.	See Appe	ndix C.			ı		-
			Commun									[0.13	(303a)
		•	heat fro									ļ	0.87	(303b)
Fraction	n of tota	al space	heat fro	m Comn	nunity Cl	HP				(3	02) x (303	a) =	0.13	(304a)
Fraction	n of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for c	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	g											kWh/year	
Annua	l space	heating	requiren	nent									5423.71	
Space	heat fro	m Comr	munity C	HP					(98) x (30	04a) x (30	5) x (306) =	=	740.34	(307a)
												-		

					_
Space heat from heat source 2		(98) x (304b) x	$(305) \times (306) =$	4954.56	(307b)
Efficiency of secondary/supplemen	tary heating system in % (from	Table 4a or Appen	idix E)	0	(308
Space heating requirement from se	econdary/supplementary systen	n (98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2233.94]
If DHW from community scheme: Water heat from Community CHP		(64) v (303a) v	(305) x (306) =	304.93	(310a)
Water heat from heat source 2			$(305) \times (306) =$	2040.71](310b)
Electricity used for heat distribution			(e) + (310a)(310e)] =	80.41](313)
Cooling System Energy Efficiency		0.01 × [(307a)(307	c) 1 (010a)(010c)] =	0](314)
Space cooling (if there is a fixed co		= (107) ÷ (314)	_	0](315)
Electricity for pumps and fans withi	,	= (107) ÷ (314)	_	0	
mechanical ventilation - balanced,		ıtside		247.21	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (330l	b) + (330g) =	247.21	(331)
Energy for lighting (calculated in Ap	ppendix L)			420.97	(332)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
					_
Heat efficiency of CHP unit				63	(362)
Heat efficiency of CHP unit		Energy kWh/year	Emission factor kg CO2/kWh		(362)
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =			Emissions	(362)
·		kWh/year	kg CO2/kWh	Emissions kg CO2/year	_
Space heating from CHP)		kWh/year ×	kg CO2/kWh	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year 1175.14	0.22 0.52	Emissions kg CO2/year 253.83	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 1175.14 X 359.59 X 484.02 X 148.11 X	0.22 0.52 0.22	253.83 -186.63 104.55	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to	kWh/year 1175.14 X 359.59 X 484.02 X 148.11 X	0.22 0.52 0.22 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.22 0.52 (366) for the second fue	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $(307b) + (310a) + (31$	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to [(307b)+(31)) on [(3)] inity systems (36)	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $(307b) + (31a)$ on $(3a)$ inity systems $(3a)$ $(3a)$ $(3a)$ $(3a)$ $(3a)$	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications of the communication of the communic	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using two services of the servic	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using two services of the servic	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15 0 1699.15	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from ime Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using two services of the servic	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue 0.22 0.52 0.52 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15 0 1699.15 128.3	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with electricity for	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using two services of the servic	kWh/year 1175.14 359.59 484.02 148.11 x vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 33)(366) + (368)(372 29) x us heater (312) x 23) + (374) + (375) = 1 (331)) x	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue 0.22 0.52 0.52 0.52 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 96.7 1562.54 41.73 1699.15 0 1699.15 128.3	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (378)

El rating (section 14)

81.98 (385)

		Į	Jser D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 20	12		Stroma Softwa					016363 on: 1.0.4.10	
		Pro	perty A	Address	: Flat 0-2	2-Clean				
Address:	acional									
Overall dwelling dimen	ISIONS.		Aros	ı(m²)		Av. Hei	iaht(m)		Volume(m³	a
Basement			_	<u> </u>	(1a) x		5.1	(2a) =	134.45) (3a)
Ground floor					(1b) x		2.6](2b) =	173.97	(3b)
) . (4 b.) . (4 b.) . (4 d.) . (4	a). (4m)					0](25) -	173.97	(00)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	e)+(1n)	11	0.28	(4)					_
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:				-41		4-4-1				_
		econdary heating		other		total			m³ per hou	r
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fan	s				Ī	0	x ′	10 =	0	(7a)
Number of passive vents					Ē	0	x ′	10 =	0	(7b)
Number of flueless gas fire	es				F	0	X 4	40 =	0	(7c)
_					<u>L</u>					
								Air ch	anges per ho	our
Infiltration due to chimney	s, flues and fans = (6a)+(6b)+(7a))+(7b)+(7	7c) =	Γ	0		÷ (5) =	0	(8)
If a pressurisation test has be		led, proceed t	to (17), c	otherwise o	continue fr	rom (9) to (16)			_
Number of storeys in the	e dwelling (ns)						F(O)	41.04	0	(9)
Additional infiltration	DE for atool or timbor	frama ar O	OF for	maaan	n, oonotr	untion	[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0.2 if both types of wall are pre					•	uction			0	(11)
deducting areas of opening		openumg to the	.e g. can	or man are	a (a.to.					
If suspended wooden flo	,	aled) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, ente	•								0	(13)
Percentage of windows	and doors draught s	tripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate					, , ,	12) + (13) +			0	(16)
Air permeability value, o	•				•	etre of e	nvelope	area	3	(17)
If based on air permeabilit	•					in haina			0.15	(18)
Air permeability value applies Number of sides sheltered		is been done	or a deg	iree air pei	тпеаышу	is being us	sea		2	(19)
Shelter factor	•			(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorporating	na shelter factor			(21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified fo		d							V.12	` ′
	Mar Apr May	1 1	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe					•				ı	
in in it is a specific to the		1 1						1	1	

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

(22)m=

Wind Factor (22a)m = (22)r	n ÷ 4									
(22a)m= 1.27 1.25 1.2		1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (all	oveing for aboli	tor and wind a	annod)	(21a) v ((22a)m	!			l	
Adjusted infiltration rate (all		0.12 0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air chan		I	1	[0.11	0.12	0.12	0.10	0.14		
If mechanical ventilation:									0.5	(23a)
If exhaust air heat pump using) = (23a)			0.5	(23b)
If balanced with heat recovery:	•	-	,	·					76.5	(23c)
a) If balanced mechanica (24a)m= 0.27 0.26 0.2		th heat recov 0.24 0.23	ery (MVI	HR) (24a _{0.23}	m = (2) 0.23	2b)m + (2 0.24	23b) × [1 0.25	- (23c) 0.25	÷ 100] 	(24a)
` '		ļ	ļ	<u> </u>				0.25		(24a)
b) If balanced mechanica		0 0	overy (r	0	0	0	230)	0		(24b)
c) If whole house extract				ا			•			(= 13)
if (22b)m < 0.5 × (23b	-	•				.5 × (23b)			
(24c)m= 0 0 0	0	0 0	0	0	0	0	0	0		(24c)
d) If natural ventilation or									•	
if (22b)m = 1, then (2		 		```					ı	(0.4.1)
(24d)m= 0 0 0	0 (24)	0 0	0	0	0 (0.5)	0	0	0		(24d)
Effective air change rate (25)m= 0.27 0.26 0.2		or (24b) or (24 0.24 0.23	c) or (24	d) in box	0.23	0.24	0.25	0.25	1	(25)
(25)m= 0.27 0.26 0.2	0.25	0.24	0.23	0.23	0.23	0.24	0.23	0.25		(23)
3. Heat losses and heat lo	•									
3. Heat losses and heat lo ELEMENT Gross area (m²)	ss parameter: Openings m²	Net Aı A ,ı		U-valu W/m2		A X U (W/F	<)	k-value kJ/m²-l		A X k kJ/K
ELEMENT Gross	Openings			W/m2			<) 			
ELEMENT Gross area (m²)	Openings	Α ,ι	m ²	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Openings	A ,ı	m² x 2 x1	W/m2	K = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,1	m ² x 2 x ¹ x 1	W/m2 1.2 /[1/(1.2)+	K = 0.04] = 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	A ,1 2.6 13.52 2.73	m ² x 2 x ¹ x 1 x 1 x 1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	K = 0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<) 			kJ/K (26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,1 2.6 13.5: 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63	<)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02	<)			kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Openings	A ,1 2.6 13.52 2.73 4.16 7.54 3.51	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707				(26) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Openings m ²	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3: 34.1:	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521	<)			kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	Openings m ²	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3 34.1	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61	<)			kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 3.2	Openings m² 34.06	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.3 34.1 10.79 3.2	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48	<)			kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07	Openings m² 34.06 0	A ,1 2.6 13.5; 2.73 4.16 7.54 3.51 43.3 34.1: 10.79 3.2 43.0	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46	<)			kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3: 34.1: 10.7: 3.2 43.0: 28.3:	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25	<)			kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 See 56.95 Part of Type 5	34.06 0 0	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3: 34.1: 10.79 3.2 43.0: 28.3: 56.99	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3 34.1: 10.7! 3.2 43.0 28.3: 56.9!	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59	<)			(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See 56.95 Roof Type2 4.76	34.06 0 0 0	A ,1 2.6 13.5: 2.73 4.16 7.54 3.51 43.3: 34.1 10.79 3.2 43.0: 28.3: 56.9: 10.5: 4.76	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59	<)			(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

Party of	eilina					62.16					Г		-	(32b)
-	•	roof winde	ows, use e	effective wi	ndow U-va			formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		(02.5)
					ls and part					, -	-			
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	- TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•		ere the de tailed calci		constructi	ion are not	known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
					using Ap	nendix k	<					ı	37.2	(36)
	•	,	,		= 0.15 x (3	•	•					l	51.2	(00)
	abric he			, ,	·	•			(33) +	(36) =			108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		
			=\								Sum(39) ₁ .	12 /12=	133.41	(39)
			HLP), W	r						= (39)m ÷				
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22	4.04	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	average =	Sum(40) ₁ .	12 / 12=	1.21	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								1						
4. Wa	iter heat	ing enei	gy requi	irement:								kWh/ye	ear:	
				irement:									ear:	(10)
Assum	ied occu	ıpancy, İ	N		(-0.0003	349 x (TF	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ıpancy, İ	N		(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.			ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	: [1 - exp ge in litre	es per da	ıy Vd,av	erage =	(25 x N)	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	: [1 - exp ge in litre usage by		ay Vd,av	erage = designed t	(25 x N)	+ 36		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per l	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by r day (all w	es per da 5% if the d vater use, I	ay Vd,avelwelling is	erage = designed ((25 x N) to achieve	+ 36 a water us	se target o	9) 10°	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the o	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usag hot water person per Mar	[1 - exp ge in litre usage by r day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2	par:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) 10 ² Nov	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	ge in litre usage by r day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usage hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all wash month 99.07	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	1.09 Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	Ined occurrence of A > 13.9 If A £ 13.9 If average the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of the annual of that 125 If average in the annual of the annual	ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy ipan	H + 1.76 x Atter usage hot water person per Mar day for ear 103.11 used - cal 148.83	ge in litre usage by a day (all was Apr ach month 99.07	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avelwelling is not and co. Jun ctor from 7 90.98 190 x Vd,n 107.44	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24 boxes (46)	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Fotal = Su 134.73 Fotal = Su	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I ipancy, I	+ 1.76 x ater usage hot water person per Mar day for ea 103.11 used - cal	ge in litre usage by a day (all wash month 99.07	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 97m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32	ge in litre usage by a day (all was Apr ach month 99.07 culated month 129.76 for use (not 19.46	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave welling is not and co. Jun ctor from 7 90.98 190 x Vd,r 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56 enter 0 in 14.93	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage e volum	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 103.11 used - cal 148.83 ang at point 22.32 includir	ge in litre usage by a day (all we have ach month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated month generated months generated genera	es per da 5% if the of	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9	ppancy, I p, N = 1 p, N = 1 e hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32 includir and no tal	ge in litre usage by r day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,ave welling is not and co. Jun go.98 190 x Vd,r. 107.44 storage), 16.12 /WHRS nter 110	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir water sale includir and tal hot water sale includir sale incl	ge in litre usage by a day (all we have month 129.76 and 19.46 and and and and and and and and and and	es per da 5% if the of water use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46) (47)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Otherv Water a) If m	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water sale includir water sale includir and tal hot water sale includir sale incl	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ng any so ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fac 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) =$	110	(50)
b) If manufacturer's declared cylinder loss factor is not known	1:		·
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3		0.02	(51)
Volume factor from Table 2a		1.03	(52)
Temperature factor from Table 2b		0.6	(53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	1.03	(54)
Enter (50) or (54) in (55)	(11)11(01)11(02)11(00)	1.03	(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$		
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m where	I I (H11) is from Append	ix H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(57)
		0	(58)
Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 3	365 v (41)m	0	(50)
(modified by factor from Table H5 if there is solar water hea	, ,	ostat)	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.26	22.51 23.26	(59)
			, ,
Combi loss calculated for each month (61)m = (60) \div 365 × (4	i i i		(04)
(61)m= 0 0 0 0 0 0 0	0 0 0	0 0	(61)
Total heat required for water heating calculated for each mon	- 	(46)m + (57)m +	`
(62)m= 220.18 194.16 204.11 183.25 179.78 160.93 154.83	3 169.52 169.1 190	200.56 214.98	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	ity) (enter '0' if no solar contribut	tion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)		1
(63)m= 0 0 0 0 0 0	0 0 0	0 0	(63)
Output from water heater			
(64)m= 220.18 194.16 204.11 183.25 179.78 160.93 154.83	3 169.52 169.1 190	200.56 214.98	
	Output from water heate	er (annual) ₁₁₂	2241.41 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45)	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m]
(65)m= 99.05 87.9 93.71 85.94 85.62 78.52 77.32	82.21 81.23 89.02	91.69 97.32	(65)
include (57)m in calculation of (65)m only if cylinder is in the	dwelling or hot water is f	rom community h	eating
5. Internal gains (see Table 5 and 5a):			
Metabolic gains (Table 5), Watts			
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct	Nov Dec	
(66)m= 140.82 140.82 140.82 140.82 140.82 140.82 140.82	 	140.82 140.82	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a),	also see Table 5	!	
(67)m= 24.25 21.53 17.51 13.26 9.91 8.37 9.04	11.75 15.77 20.03	23.38 24.92	(67)
Appliances gains (calculated in Appendix L, equation L13 or L	.13a), also see Table 5		•
(68)m= 271.96 274.78 267.67 252.53 233.42 215.46 203.40	3 200.63 207.75 222.89	242 259.96	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15	a), also see Table 5	•	
(69)m= 37.08 37.08 37.08 37.08 37.08 37.08 37.08	37.08 37.08 37.08	37.08 37.08	(69)
Pumps and fans gains (Table 5a)			l
(70)m= 0 0 0 0 0 0 0	0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	1 1		
(71)m= -112.66 -112.66 -112.66 -112.66 -112.66 -112.66 -112.6	6 -112.66 -112.66 -112.66	-112.66 -112.66	(71)

Water (72)m=	133.14	1 130.8	125.95	119.36	115.08	10	09.05	103.93	110	.49 112.83	119.6	5 127.35	130.81]	(72
` ′		al gains =		110.00	110.00	T				3)m + (69)m +					(
(73)m=	494.59	, 	476.38	450.39	423.65	3	98.12	381.67	388	· · · · ·	427.8	 	480.94	1	(73
` ′	ar gair		11 0.00	100.00	120.00	1	00.12	001.01	000	101.00	121.0	107.07	100.01		(, ,
			using sola	r flux from	Table 6a	and	l assoc	iated equa	itions	to convert to th	e applic	able orientat	ion.		
Orienta	ation:	Access F	actor	Area			Flu	IX		g_		FF		Gains	
		Table 6d		m²			Tal	ble 6a		Table 6b		Table 6c		(W)	
Northea	ast _{0.9x}	0.54	х	13.	52	X	1	1.28	x	0.24	х	0.7	=	12.46	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	1	1.28	x	0.24	x	0.7	=	3.59	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	1	1.28	x	0.24	x	0.7	=	5.46	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	2	22.97	x	0.24	x	0.7	=	25.35	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	2	22.97	x	0.24	x	0.7	=	7.3	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		22.97	x	0.24	×	0.7	=	11.12	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	4	11.38	x	0.24	x	0.7	_ =	45.68	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	4	11.38	x	0.24	x	0.7	=	13.15	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	4	11.38	x	0.24	x	0.7		20.04	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	6	67.96	x	0.24	x	0.7	=	75.02	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	6	67.96	x	0.24	x	0.7	=	21.6	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	6	67.96	x	0.24	x	0.7		32.91	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	9	91.35	x	0.24	x	0.7	=	100.84	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	9	91.35	X	0.24	x	0.7	=	29.03	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	9	91.35	x	0.24	x	0.7	=	44.24	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	9	97.38	X	0.24	x	0.7	=	107.5	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	X	9	97.38	X	0.24	x	0.7	=	30.95	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	9	7.38	X	0.24	x	0.7	=	47.17	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X		91.1	X	0.24	x	0.7	=	100.56	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	X		91.1	X	0.24	x	0.7	=	28.96	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X		91.1	x	0.24	x	0.7	=	44.12	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	7	72.63	X	0.24	x	0.7	=	80.17	(75
Northea	ast 0.9x	0.77	X	2.7	' 3	X	7	72.63	X	0.24	x	0.7	=	23.08	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	7	72.63	x	0.24	x	0.7	=	35.17	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	5	50.42	x	0.24	×	0.7	=	55.66	(75
Northea	ast 0.9x	0.77	X	2.7	73	X		50.42	x	0.24	×	0.7	=	16.03	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		50.42	x	0.24	×	0.7	=	24.42	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X		28.07	x	0.24	×	0.7	=	30.98	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	X		28.07	x	0.24	x	0.7	=	8.92	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		28.07	x	0.24	×	0.7	=	13.59	(75
Northea	ast _{0.9x}	0.54	X	13.	52	x		14.2	x	0.24	×	0.7	=	15.67	(75
Northea	ast 0.9x	0.77	x	2.7	73	x		14.2	х	0.24	×	0.7		4.51	(75

		_					7		_ ,				
Northeast _{0.9x}	0.77	X	4.16		x	14.2	X	0.24	×	0.7	=	6.88	(75)
Northeast _{0.9x}	0.54	X	13.52		х	9.21	X	0.24	x	0.7	=	10.17	(75)
Northeast _{0.9x}	0.77	X	2.73		х	9.21	X	0.24	X	0.7	=	2.93	(75)
Northeast _{0.9x}	0.77	X	4.16		х	9.21	X	0.24	X	0.7	=	4.46	(75)
Southwest _{0.9x}	0.77	X	7.54		х	36.79		0.24	x	0.7	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.54		х	62.67]	0.24	Х	0.7	=	55.02	(79)
Southwest _{0.9x}	0.77	X	7.54		х	85.75]	0.24	X	0.7	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.54		x	106.25		0.24	x	0.7	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.54		x	119.01		0.24	x	0.7	=	104.47	(79)
Southwest _{0.9x}	0.77	X	7.54		x	118.15		0.24	x	0.7	=	103.72	(79)
Southwest _{0.9x}	0.77	x	7.54		x	113.91	Ī	0.24	x	0.7		99.99	(79)
Southwest _{0.9x}	0.77	x	7.54		x	104.39	Ī	0.24	x	0.7		91.64	(79)
Southwest _{0.9x}	0.77	x	7.54		х 🔚	92.85	Ī	0.24	x	0.7	=	81.51	(79)
Southwest _{0.9x}	0.77	x	7.54		х 🔚	69.27	Ī	0.24	x	0.7		60.81	(79)
Southwest _{0.9x}	0.77	x	7.54		x	44.07	ĺ	0.24	x	0.7		38.69	(79)
Southwest _{0.9x}	0.77	x	7.54		x 🔚	31.49	Ī	0.24	x	0.7		27.64	(79)
Northwest _{0.9x}	0.77	X	3.51		x	11.28	X	0.24	×	0.7		4.61	(81)
Northwest _{0.9x}	0.77	x	3.51		x	22.97	X	0.24	x	0.7		9.39	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🗀	41.38	j×	0.24	x	0.7		16.91	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	67.96	X	0.24	×	0.7	=	27.77	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	91.35	X	0.24	×	0.7	=	37.33	(81)
Northwest 0.9x	0.77	×	3.51		x 🗀	97.38	X	0.24	x	0.7		39.8	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	91.1	X	0.24	x	0.7	=	37.23	(81)
Northwest 0.9x	0.77	x	3.51		x 🗀	72.63	X	0.24	x	0.7		29.68	(81)
Northwest 0.9x	0.77	×	3.51		x 🗀	50.42	X	0.24	- x	0.7		20.6	(81)
Northwest 0.9x	0.77	x	3.51		x 🗀	28.07	X	0.24	x	0.7		11.47	(81)
Northwest _{0.9x}	0.77	×	3.51	\equiv	x 🔚	14.2	X	0.24	- x	0.7		5.8	(81)
Northwest _{0.9x}	0.77	X	3.51		x 🔚	9.21	X	0.24	x	0.7	╡ .	3.77	(81)
L	-				<u> </u>		_	-					` ′
Solar gains in	watts, calc	ulated	for each r	nonth			(83)m	n = Sum(74)m	(82)m				
(83)m= 58.42		71.06		15.91	329.13	310.86	259	.75 198.22	125.77	71.55	48.97		(83)
Total gains – i	nternal and	d solar	$(84)m = (7)^{-1}$	73)m -	+ (83)n	n , watts		'		•		_	
(84)m= 553	600.54 6	647.44	700.96 7	39.56	727.25	692.54	647	.87 599.81	553.58	529.52	529.9		(84)
7. Mean inter	nal temper	rature (heating se	eason')								
Temperature		`				a from Ta	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	tor for gair	ns for li	ving area,	h1,m	(see 1	able 9a)							
Jan	Feb	Mar	Apr	May	Jun		Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	1	1	0.99	0.96	0.88	0.75	0.	8 0.95	0.99	1	1		(86)
Mean interna	l temperati	ure in li	iving area	T1 (fc	llow st	ens 3 to	7 in T	able 9c)				_	
(87)m= 19.56		19.9		20.56	20.83	-i	20.		20.3	19.88	19.55	1	(87)
	<u> </u>								1		<u> </u>	_	
Temperature (88)m= 19.9	_ <u> </u>	19.9		19.91	19.92	-	19.		19.91	19.91	19.91	7	(88)
(00)111-	1 10.0	10.0	10.01		10.02	10.02	1 19.	13.32	10.91	1 10.91	10.01	J	(30)

Utilisa	ation fac	tor for a	ains for i	rest of d	wellina. I	n2.m (se	ee Table	9a)						
(89)m=	1	1	1	0.99	0.95	0.81	0.61	0.67	0.91	0.99	1	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	le 9c)				
(90)m=	17.98	18.14	18.47	18.95	19.43	19.79	19.9	19.89	19.65	19.06	18.45	17.96		(90)
									1	fLA = Livin	g area ÷ (4	1) =	0.14	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = fl	LA × T1	+ (1 – fL	.A) × T2			<u> </u>		_
(92)m=	18.2	18.36	18.67	19.13	19.59	19.94	20.05	20.04	19.8	19.23	18.65	18.18		(92)
Apply	adjustn	nent to th	ne mean	internal	tempera	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.2	18.36	18.67	19.13	19.59	19.94	20.05	20.04	19.8	19.23	18.65	18.18		(93)
8. Sp	ace hea	ting requ	uirement											
		mean int factor fo				ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa		tor for g		<u> </u>										
(94)m=	1	1	0.99	0.98	0.94	0.82	0.62	0.69	0.91	0.98	1	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m=	551.87	598.52	642.85	687.01	693.46	592.99	432.47	443.82	545.07	545.07	527.51	529.03		(95)
	<u> </u>	_			from Ta			<u> </u>	ı					(22)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
					1050.37		=[(39)m : 454.31	x [(93)m 477.83	- (96)m 753.68	1149.8	1545.14	1878.77		(97)
							th = 0.02	l .				1070.77		(91)
(98)m=	991.29	820.95	743.73	488.54	265.54	0	0.02	0	0	449.92	732.69	1004.21		
` '							<u> </u>	<u> </u>	l I per year	l(kWh/year	<u> </u>	8) _{15,912} =	5496.88	(98)
Spac	e heatin	g require	ement in	kWh/m²	/year						,		49.84]] [99)
		• .			heating	scheme								J` ′
					The state of the s		ater heat	tina prov	ided by	a comm	unitv sch	neme.		
		-				-	neating (• .	-		,		0	(301)
Fractio	n of spa	ce heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme may	/ obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and	up to four	other heat	sources; tl	he latter	-
			-		aste heat f	rom powe	r stations.	See Appe	ndix C.			i	0.40	7(2025)
		at from C			•								0.13	(303a)
		nmunity										ļ	0.87	(303b)
		·			nunity Cl					(3	02) x (303	a) =	0.13	(304a)
Fraction	n of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	communi	ty heatii	ng syste	m					1.05	(306)
Space	heating	9											kWh/year	_
Annua	l space	heating	requirem	nent									5496.88	
Space	heat fro	m Comr	nunity C	HP					(98) x (30	04a) x (30	5) x (306) =	=	750.32	(307a)
												-		

					7
Space heat from heat source 2		(98) x (304b) x	$(305) \times (306) =$	5021.4	(307b)
Efficiency of secondary/supplement	tary heating system in % (from	Table 4a or Appen	ndix E)	0	(308
Space heating requirement from se	condary/supplementary syster	n (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2241.41]
If DHW from community scheme: Water heat from Community CHP		(64) v (303a) v	(305) x (306) =	305.95	(310a)
Water heat from heat source 2			$(305) \times (306) =$	2047.53	(310b)
Electricity used for heat distribution			'e) + (310a)(310e)] =	81.25	(313)
Cooling System Energy Efficiency F		0.01 × [(307a)(307	e) + (310a)(310e)] =](314)
		(407) + (244)		0] · · · ·
Space cooling (if there is a fixed co	,	$=(107) \div (314)$	=	0	(315)
Electricity for pumps and fans within mechanical ventilation - balanced, e		utside		253.98	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/	year	=(330a) + (330	b) + (330g) =	253.98	(331)
Energy for lighting (calculated in Ap	ppendix L)			428.18	(332)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat officional of CHD unit					_
Heat efficiency of CHP unit				63	(362)
neat efficiency of ChP unit		Energy kWh/year	Emission factor kg CO2/kWh		(362)
Space heating from CHP)	(307a) × 100 ÷ (362) =	•		Emissions	(362)
·		kWh/year	kg CO2/kWh	Emissions kg CO2/year	
Space heating from CHP)		kWh/year	kg CO2/kWh	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year 1190.99 × 364.44 ×	0.22 0.52	Emissions kg CO2/year 257.25	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	1190.99 X 364.44 X 485.64 X 148.61 X	0.22 0.52 0.22	257.25 -189.15 104.9	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to	1190.99 X 364.44 X 485.64 X 148.61 X	0.22 0.52 0.22 0.52	257.25 -189.15 104.9 -77.13	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $[(307b)+(310) + (3$	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.22 0.52 (366) for the second fue	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $[(307b)+(310) + (3$	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $[(307b)+(31)]$ in $[(307b)+(31)]$ in $[(307b)+(31)]$ if y systems	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using to $[(307b)+(31)]$ In [(3) If the expression of the	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications of the communication of the communic	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] n	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] In [(307b)+(31)] I	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04 0 1717.04	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] In [(307b)+(31)] I	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue 0.22 0.52 0.52 0.52 = 0.52 = 0.52 = 0.52 =	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04 0 1717.04 131.81	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with electricity for page 12.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] In [(307b)+(31)] I	kWh/year 1190.99 364.44 485.64 148.61 x vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 33)(366) + (368)(372 99) x us heater (312) x (33) + (374) + (375) = (331)) x	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue 0.22 0.52 0.52 = 0.52 = 0.52 = 0.52 = 0.52	Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04 0 1717.04 131.81	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (378)

El rating (section 14)

82.13 (385)

		l Iser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	roperty	Address	Flat 1-	1-Clean				
Address: 1. Overall dwelling dimer	noiono:								
1. Overall dwelling diffie	NSIONS.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) :	74.06	(4)			.		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:								102100	
2. Vermanorrate.	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		7 + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	j = [0	x	20 =	0	(6b)
Number of intermittent far	ns			, <u> </u>	0	x .	10 =	0	(7a)
Number of passive vents				Ē	0	x .	10 =	0	(7b)
Number of flueless gas fir	res			F	0	x	40 =	0	(7c)
				_					
							Air ch	anges per ho	our —
•	vs, flues and fans = $(6a)+(6b)+(6b)+(6b)$ een carried out or is intended, proces			continue fr	0		÷ (5) =	0	(8)
Number of storeys in th		tu 10 (17),	ourier wise t	onunae n	om (9) to	(10)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are producting areas of opening	esent, use the value corresponding t gs); if equal user 0.35	o the grea	ter wall are	a (atter					
•	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent								0	(13)
Window infiltration	and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
•	ty value, then $(18) = [(17) \div 20] + (18)$							0.15	(18)
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed	ĺ	_	7(10)
Number of sides sheltered Shelter factor	u		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorporati	ing shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind speed						l		
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7				•			•	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate ((allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.16		0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effect		-	rate for t	he appli	cable ca	se			•			<u>-</u>	
If mechanica			andiv NL (O	ah) (aa	a) Em. /	augtion (I	NEV otho	muiaa (22h	\ (225\			0.5	(23a
If exhaust air he) = (23a)			0.5	(23b
If balanced with			-	_					21.)		4 (00.)	76.5	(230
a) If balance						- ` ` 	- ^ ` ` 	i `	 		- ` ` `) ÷ 100] 1	(246
(24a)m= 0.28		0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(24a
b) If balance						 	- ^ ` ` - 	ŕ	r Ó		<u> </u>	1	(0.41)
(24b)m= 0	0	0	0	0		0	0	0	0	0	0]	(24b
c) If whole he				•	•				E v (22h	.\			
(24c)m = 0	$0.5 \times (2)$	0	0	0 = (231)	0	0	$\frac{C}{C} = (22)$	0	0	0	0	1	(240
· ',										0		J	(2.0
d) If natural v if (22b)m	n = 1, then				•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(240
Effective air	change ra	te - er	ıter (24a	or (24k	o) or (24	c) or (24	d) in bo	x (25)	ļ.		!	1	
(25)m= 0.28	 _	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	1	(25)
					ı	l	ı	ı	l		ı	1	
3. Heat losses		loss p			NIat Au		Himal		A V I I		l l	_	A V I-
ELEMENT	Gross area (m	∩²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-valu kJ/m²·		A X k kJ/K
Doors	,	,			2.6	x	1.2		3.12	<u></u>			(26)
Windows Type	: 1				3.26		/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type					3.95	〓 .	/[1/(1.2)+		4.52				(27)
Windows Type					5.51	_	/[1/(1.2)+		6.31	=			(27)
Windows Type					0.65	_	/[1/(1.2)+		0.74				(27)
Floor	· ¬					=		;		ᆿ ,			(28)
		_			14.69	=		ᆗ ゙!	1.6159	-			 `
Walls Type1	67.78	4	20.5	3	47.2	=	0.15	_ = !	7.08	ᆜ !		_	(29)
Walls Type2	24.47	닠	2.6		21.87	7 X	0.15	=	3.28	닠 !		_	(29)
Walls Type3	5.93		0		5.93	X	0.15	=	0.89				(29)
Total area of e	lements, n	n²			112.8	7							(31)
Party wall					12.38	3 X	0	=	0				(32)
Party floor					59.37	7							(32a
Party ceiling					74.06	5							(32)
* for windows and ** include the area						ated using	g formula 1	/[(1/U-valu	ıе)+0.04] а	s given in	paragrapi	h 3.2	
Fabric heat los	s, W/K = 5	S (A x	U)				(26)(30) + (32) =				39.55	(33)
Heat capacity (Cm = S(A	xk)						((28).	(30) + (32	2) + (32a).	(32e) =	27754.	95 (34)
Thermal mass	paramete	r (TMF	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
For design assess can be used instead				construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge				ısina Ar	pendix I	<						18.19	(36)
omai briage	(L X	. , oan	caiaica (, , , , , , , , , , , , , , , , , , ,	י אוטוייטקי	•						10.18	,(30)

if details o			are not kn	own (36) =	= 0.15 x (3	1)						·		_
Total fal									` '	(36) =			57.74	(37)
Ventilati	т								` ′	·	(25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat tra	nsfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		_
Heat los	ss parar	meter (H	ILP), W/	′m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	74.07	(39)
(40)m=	1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01		
	•									Average =	Sum(40) ₁	12 /12=	1	(40)
Number	of days	s in mor	nth (Tabl	le 1a)		ı				ı		1		
_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wate	er heati	ng ener	gy requi	rement:								kWh/ye	ear:	
_														
Assume				[1 ovn	(0 0003	240 v (TE	FA -13.9	\2\1 + O (1012 v (TEA 12		.34		(42)
	۱۵.9 ۱£ 13.9		+ 1.76 X	[ı - exp	(-0.0003	949 X (11	-A -13.9)2)] + 0.0) X C I U	IFA - 13.	.9)			
Annual a		•	iter usac	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
Reduce th	ne annual	average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		0		(- /
not more t	that 125 l	litres per p	person per	day (all w	ater use, l	hot and co	ld)					_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy co	ontent of I	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
		!				Į.		l	_	rotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instanta	neous wa	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)			'		
(46)m=	21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water st	-					•		•				•		
Storage	volume	e (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comm	•	_			-			, ,						
Otherwis			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water st	•		الممسما	ft-		(14) (14)	- /-l : \ .							(10)
,				oss facto	or is kno	wn (Kvvr	i/day):					0		(48)
Tempera												0		(49)
Energy I			•	-				(48) x (49)) =		1	10		(50)
Hot wate				cylinder l								02		(51)
If comm		_			- (v)	., 0, 00	7)					.02		(01)
Volume	-	_		-							1.	.03		(52)
Tempera				2b								.6		(53)
Energy I	lost fror	n water	storage	, kWh/ve	ear			(47) x (51)	x (52) x (53) =		.03		(54)
9, '				, , y .				. ,				VV.		()
Enter (5	50) or (5	54) in (5	55)						, , ,			.03		(55)

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	i –	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if constant of the consta	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Append	only if controls: May 117.03 L, equation 7.53 dix L, equalication 7.53	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if constructions: May 117.03 L, equation 7.53 dix L, equation 177.31 L, equation 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if constructions: May 117.03 L, equation 7.53 dix L, equation 177.31 L, equation 34.7	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in Ap 14.7 (Table 5 0 n (negation 5)	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 Dee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

															<u>-</u>
Southwest _{0.9x}	<u> </u>	x	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwest _{0.9x}	0.77	x	0.6	35	X	9	2.85]		0.24	x	0.7	=	7.03	(79)
Southwest _{0.9x}	0.77	×	5.5	51	x	6	9.27]		0.24	×	0.7	_	44.43	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7	_	28.27	(79)
Southwest _{0.9x}	0.77	X	0.6	35	x	4	4.07]		0.24	x	0.7	=	3.34	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	3	1.49]		0.24	x	0.7		20.2	(79)
Southwest _{0.9x}	0.77	X	0.6	35	x	3	1.49			0.24	x	0.7		2.38	(79)
Solar gains ir	n watts, c	alculated	for eac	h month				(83)m	n = Si	um(74)m .	(82)m			_	
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts							_	
(84)m= 453.33	489.52	524.22	562.95	590.51	57	79.86	553.11	521	.02	485.99	452.34	434.89	435.38	3	(84)
7. Mean inte	ernal temp	perature	(heating	season)										
Temperatur	e during h	neating p	eriods ir	n the livi	ng :	area 1	from Tal	ole 9,	, Th	1 (°C)				21	(85)
Utilisation fa	actor for g	ains for l	living are	ea, h1,m	(Se	ee Ta	ble 9a)								
Jan	Feb	Mar	Apr	May	È	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	:	
(86)m= 1	1	0.99	0.97	0.91	(0.75	0.57	0.6	62	0.87	0.98	1	1	7	(86)
Mean intern	al temper	ature in	living ar	-a T1 (fo	مااد	w ste	ns 3 to 7	7 in T	ahle	2 9c)				_	
(87)m= 19.95		20.26	20.54	20.8	_	0.96	20.99	20.	_	20.89	20.57	20.22	19.93	٦	(87)
` '							l	I					<u> </u>	_	
Temperatur (88)m= 20.07		20.07	20.08	20.08	_	eiiing 20.1	20.1	20.	$\overline{}$	20.09	20.08	20.08	20.08	\neg	(88)
` '	1						l	<u> </u>	., 1	20.09	20.00	20.00	20.00		(00)
Utilisation fa					_	·	r	É				_		_	41
(89)m= 1	0.99	0.99	0.96	0.87	(0.66	0.46	0.5	51	0.8	0.97	0.99	1		(89)
Mean intern	al temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)			_	
(90)m= 18.66	18.82	19.12	19.53	19.88	2	0.06	20.09	20.	09	20	19.58	19.06	18.64		(90)
										f	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean intern	al temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 19	19.15	19.42	19.8	20.12	2	20.3	20.33	20.	33	20.23	19.84	19.37	18.98		(92)
Apply adjus	tment to t	he mean	interna	temper	atu	re fro	m Table	4e,	whe	re appro	priate			_	
(93)m= 19	19.15	19.42	19.8	20.12	2	20.3	20.33	20.	33	20.23	19.84	19.37	18.98		(93)
8. Space he	ating req	uirement													
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	le 9b	o, so tha	t Ti,m=	:(76)m an	d re-ca	lculate	
the utilisatio	1			1		Luce	11	Ι		0	0-4	l Na		7	
Jan Utilisation fa		Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(94)m= 1	0.99	0.98	0.96	0.87	<u> </u>	0.68	0.49	0.5	54	0.82	0.96	0.99	1	7	(94)
Useful gains				<u> </u>	<u> </u>	3.00	0.10		<u>, </u>	0.02	0.00	1 0.00			(- /
(95)m= 451.45		516.24	538.32	514.26	39	95.73	269.42	281	1.3	396.19	436.36	431.29	433.93		(95)
Monthly ave				l .	<u> </u>		I	ı				1	1	_	•
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	7	(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(93	 3)m-	 – (96)m]	-		_	
	8 1073.13	r	807.72	622.56	_	15.42	271.85	285		449.57	683.17	911.67	1104.4	8	(97)
	-!				_									_	

Space	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m=	490.17	394.49	337.86	193.97	80.58	0	0	0	0	183.63	345.87	498.89		
•				-		-	-	Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	2525.45	(98)
Space	e heatin	g require	ement in	kWh/m²	/year							Ī	34.1	(99)
8c. Sp	pace co	oling rec	luiremer	nt										
Calcu	lated fo	r June,	luly and	August.	See Tal	ble 10b				,				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		<u> </u>				·		and ext	ı	 	1	Г		(400)
(100)m=		0	0	0	0	685.27	539.47	552.51	0	0	0	0		(100)
		tor for lo	oss nm	0	0	0.00	0.94	0.02	0	T 0	0	0		(101)
(101)m=				(100)m x		0.89	0.94	0.93	0	0		0		(101)
(102)m=		0	0	0	0	608.06	508.87	511.09	0	0	0	0		(102)
								ee Table						,
(103)m=		0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
•				r month, : 3 × (98		dwelling,	continu	ous (kW	h') = 0.0)24 x [(10	03)m – (102)m]x	(41)m	
(104)m=	0	0	0	0	0	103.63	156.51	127.74	0	0	0	0		
'						•	•		Tota	l = Sum(104)	=	387.89	(104)
	I fraction								f C =	cooled	area ÷ (4	4) = [0.6	(105)
ı		<u> </u>	able 10b	 		0.05	0.05	T 0.05		Ι ,				
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0	(404)	0		7(400)
Space	coolina	requirer	nent for	month =	: (104)m	× (105)	× (106)r	m	TOla	l = Sum(1 <u>04</u>)	= [0	(106)
(107)m=		0	0	0	0	15.57	23.51	19.19	0	0	0	0		
						•	•	•	Tota	l = Sum(107)	=	58.27	(107)
Space	cooling	requirer	ment in k	«Wh/m²/y	/ear				(107) ÷ (4) =		Ī	0.79	(108)
9b. En	ergy rec	quiremer	nts – Cor	mmunity	heating	scheme)							
								ting prov			unity sch	neme.		_
Fractio	n of spa	ace heat	from se	condary,	/supplen	nentary l	heating	(Table 1	1) '0' if n	ione		Ĺ	0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-					•		allows for See Appe		up to four	other heat	sources; th	ne latter	
			commun		ioto mout i	rom power	danone.	GGG 7 Ippol	nuix O.			Γ	0.13	(303a)
Fractio	n of cor	nmunity	heat fro	m heat s	ource 2							Ī	0.87	(303b)
Fractio	n of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fractio	n of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	stem		Ī	1	(305)
Distribu	ution los	s factor	(Table 1	12c) for c	commun	ity heati	ng syste	m				Ī	1.05	(306)
Space	heating	9										_	kWh/yea	r
Annual	space	heating	requiren	nent									2525.45	
Space	heat fro	m Comr	nunity C	HP					(98) x (3	04a) x (30	5) x (306) :	- [344.72	(307a)

Space heat from heat source 2		(98) v (30	74b) v ((305) x (306) =		2207	(307b)
Space heat from heat source 2	hooting system in 9/ (from	, , ,	,	, , ,		2307	
Efficiency of secondary/supplementary				,		0](308](300)
Space heating requirement from secon	dary/supplementary syster	11 (98) X (30	J1) X 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement						2063.55]
If DHW from community scheme: Water heat from Community CHP		(64) x (30	03a) x ((305) x (306) =		281.67	(310a)
Water heat from heat source 2				(305) x (306) =		1885.05](310b)
Electricity used for heat distribution		, , ,		e) + (310a)(310e)] = [48.18](313)
Cooling System Energy Efficiency Ratio	0	. ,	`		" <u> </u>	4.73	」` ☐(314)
Space cooling (if there is a fixed cooling		= (107) ÷	· (314) :	=	F	12.33	」` ☐(315)
Electricity for pumps and fans within dw	,	,	, ,				」` ′
mechanical ventilation - balanced, extra	• · · · · · ·	utside				158.57	(330a)
warm air heating system fans						0	(330b)
pump for solar water heating						0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) +	+ (330b) + (330g) =		158.57	(331)
Energy for lighting (calculated in Appen	ndix L)					325.25	(332)
12b. CO2 Emissions - Community hea	ting scheme						
Electrical efficiency of CHP unit						30.6	(361)
							_
Heat efficiency of CHP unit						63	(362)
Heat efficiency of CHP unit		Energy kWh/year		Emission fac kg CO2/kWh			(362)
	7a) × 100 ÷ (362) =		x			missions	(362)
		kWh/year	x x	kg CO2/kWh		missions g CO2/year	
Space heating from CHP) (30) less credit emissions for electricity -(3)		kWh/year 547.18		kg CO2/kWh		missions g CO2/year	(363)
Space heating from CHP) (30) less credit emissions for electricity -(3) Water heated by CHP (31)	07a) × (361) ÷ (362) =	547.18 167.44	x	0.22 0.52		missions g CO2/year 118.19 -86.9	(363) (364)
Space heating from CHP) (30) less credit emissions for electricity -(3) Water heated by CHP (31)	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) =	547.18 167.44 447.1 136.81	x x x	0.22 0.52 0.22 0.52	kç	missions g CO2/year 118.19 -86.9 96.57	(363) (364) (365)
Space heating from CHP) (30) less credit emissions for electricity (31) Water heated by CHP (31) less credit emissions for electricity (32)	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to	547.18 167.44 447.1 136.81	x x x 63) to (0.22 0.52 0.22 0.52	kç	missions g CO2/year 118.19 -86.9 96.57 -71.01	(363) (364) (365) (366)
Space heating from CHP) (30) less credit emissions for electricity -(3) Water heated by CHP (31) less credit emissions for electricity -(3) Efficiency of heat source 2 (%)	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)]	547.18 167.44 447.1 136.81 wo fuels repeat (36	x x x 63) to (0.22 0.52 0.52 0.52 0.652	kç d fuel	missions g CO2/year 118.19 -86.9 96.57 -71.01	(363) (364) (365) (366) (367b)
Space heating from CHP) (30) less credit emissions for electricity -(3) Water heated by CHP (31) less credit emissions for electricity -(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)]	\$\frac{\text{kWh/year}}{547.18} \\ \tag{167.44} \\ \tag{447.1} \\ \tag{136.81} \\ \text{wo fuels repeat (367)} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{367} \\ \tag{10b} \tag{10b} \tag{10b} \tag{10b} \	x x x 63) to (0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	kç d fuel =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) (30) less credit emissions for electricity -(3) Water heated by CHP (31) less credit emissions for electricity -(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(307b)	\$\frac{\text{kWh/year}}{547.18} \\ \$167.44 \\ \$447.1 \\ \$136.81 \\ wo fuels repeat (367) \\ \$10b)] \times 100 \div (367) \\ \$13) \times \$\text{13}\$	x x x 63) to (0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	kç d fuel = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) (30) less credit emissions for electricity –(3) Water heated by CHP (31) less credit emissions for electricity –(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community s	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(307b)+(32)] [(307b)	\$\frac{\text{kWh/year}}{547.18}\$ \$\frac{167.44}{447.1}\$ \$\frac{136.81}{100}\$ \$\text{yo fuels repeat (367)}{130}\$ \$\text{x}\$ \$\frac{100}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\text{x}\$ \$\text{x}\$	x x 63) to (b) x	0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.22 0.52	d fuel = = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) (30) less credit emissions for electricity –(3) Water heated by CHP (31) less credit emissions for electricity –(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community so	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(3	\$\frac{\text{kWh/year}}{547.18}\$ \$\frac{167.44}{447.1}\$ \$\frac{136.81}{100}\$ \$\text{yo fuels repeat (367)}{130}\$ \$\text{x}\$ \$\frac{100}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\frac{130}{130}\$ \$\text{x}\$ \$\text{x}\$ \$\text{x}\$	x x 63) to (b) x)(372)	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01 1018.25	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) (30) less credit emissions for electricity —(3) Water heated by CHP (31) less credit emissions for electricity —(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community source 2 CO2 associated with space heating (see	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(3	\$\frac{\text{kWh/year}}{547.18}\$ \$\frac{167.44}{447.1}\$ \$\frac{136.81}{136.81}\$ we fuels repeat (367) \$\frac{130}{130}\$ \times (367) \$\frac{130}{130}\$ \times (368) \$\frac{130}{130}\$ \times (368) \$\frac{130}{130}\$ \times (368) \$\frac{130}{130}\$ \times (368) \$\frac{130}{130}\$ \times (368)	x x 63) to (b) x)(372)	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01 1018.25 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) (30) less credit emissions for electricity —(3) Water heated by CHP (31) less credit emissions for electricity —(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(3	\$\frac{\text{kWh/year}}{547.18}\$ \$\frac{167.44}{447.1}\$ \$\frac{136.81}{136.81}\$ we fuels repeat (367.13) \text{ x} \$\frac{63}{13}\text{ x}.(366) + (368) \$\frac{19}{29}\text{ x} \$\text{us heater} (312.13) \text{ x} \$\frac{13}{13}\text{ x} + (374) + (375) \$\frac{15}{15}\text{ x}	x x 63) to (b) x)(372)	0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.5	d fuel = = = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01 1018.25 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) (30) less credit emissions for electricity –(3) Water heated by CHP (31) less credit emissions for electricity –(3) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community source 2 CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and we CO2 associated with space cooling	07a) × (361) ÷ (362) = 0a) × 100 ÷ (362) = 10a) × (361) ÷ (362) = If there is CHP using to [(307b)+(31)] [(\$\frac{\text{kWh/year}}{547.18}\$ \$\frac{167.44}{447.1}\$ \$\frac{136.81}{136.81}\$ we fuels repeat (367.13) \text{ x} \$\frac{63}{13}\text{ x}.(366) + (368) \$\frac{19}{29}\text{ x} \$\text{us heater} (312.13) \text{ x} \$\frac{13}{13}\text{ x} + (374) + (375) \$\frac{15}{15}\text{ x}	x x 63) to (b) x)(372)	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = = = =	missions g CO2/year 118.19 -86.9 96.57 -71.01 96.7 936.38 25.01 1018.25 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

17.23 (384) 85.64 (385)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	- 036 F1	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 1-2	2-Clean				
Address: 1. Overall dwelling dime	oneione:								
1. Overall dwelling diffie	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	=	0	x 4	10 =	0	(6a)
Number of open flues	0 + 0	- + -	0	_ = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x 1	10 =	0	(7a)
Number of passive vents	3			Ī	0	x 1	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	x 4	10 =	0	(7c)
				_					
		_ \	<i>(</i> _)	_			ı	nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, proced			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t					o (o) to	(1.0)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
deducting areas of openi	resent, use the value corresponding t ngs); if equal user 0.35	o irie grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	⁹ x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h					area	3	(17)
,	lity value, then $(18) = [(17) \div 20] +$	•	•	•		•		0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			<u></u>
Number of sides shelters Shelter factor	ed		(20) = 1 -	[0 075 v (*	10\1 –			3	(19)
Infiltration rate incorporate	ting shelter factor		(20) = 13 (21) = (18)		19)] =			0.78	(20)
Infiltration rate modified f	•		(=:) (:0)				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp			1 -						
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m - (2	2)m ÷ 1								
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]	
	1 1 35 1 5,000		1	<u> </u>				J	

Adjusted infiltra	alion rate (allow	ving for sl	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
	ctive air change	rate for t	he appli	cable ca	se	•	•	•	•			— ,
	al ventilation: eat pump using App	nondiy N (C	93h) — (93a	a) Em. /c	auation (VEVV otho	nuico (22h) - (220)			0.5	(23a)
	n heat recovery: effi) = (23a)			0.5	(23b)
	-	-	_					2h\ (00h) [(22°)	76.5	(23c)
a) if balance (24a)m= 0.27	ed mechanical v	0.25	0.24	at recove	0.23	0.23	0.23	2b)m + (. 0.24	23D) x [¹ 0.25	0.25	÷ 100]	(24a)
` ′	ļļ_		<u> </u>				<u> </u>	<u> </u>	<u> </u>	0.23		(244)
	ed mechanical v				overy (r		$\int_{0}^{\infty} \int_{0}^{\infty} dx = (22)$	 				(24b)
` ′	0 0	0	0	0		0		0	0	0		(240)
,	ouse extract vent $< 0.5 \times (23b)$,		•	•				.5 × (23b))			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
,	ventilation or w			•				0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a) or (24b	o) or (240	c) or (24	d) in box	· (25)				l	
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
2 Hastlesse	s and heat loss	10 0 40 100 0 th										
ELEMENT	Gross area (m²)	Openin m	ıgs	Net Ar A ,r		U-valı W/m2		A X U (W/I	≺)	k-value kJ/m²-ł		X k J/K
Doors				2.6	х	1.2	_ = [3.12				(26)
Windows Type) 1			3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	2			3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	3											
Windows Type				5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(27)
Floor	: 4			5.51 0.65	=	/[1/(1.2)+ /[1/(1.2)+	l.	6.31				(27) (27)
LIOOI	4			0.65	x1	/[1/(1.2)+	l.	0.74			-	(27)
		20.5	8	0.65	x1	/[1/(1.2)+ 0.11	0.04] =	0.74				(27)
Walls Type1	38.14	20.5		0.65 14.36 17.56	x1 x	/[1/(1.2)+ 0.11 0.15	0.04] = [0.74 1.5796 2.63				(27) (28) (29)
Walls Type1 Walls Type2	38.14	2.6		0.65 14.36 17.56 21.32	x1 x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29)
Walls Type1 Walls Type2 Walls Type3	38.14 23.92 5.95	2.6		0.65 14.36 17.56 21.32 5.95	x1 x2 x2 x4 x4 x4 x4 x4 x4 x4	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2				(27) (28) (29) (29) (29) (29)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (29) (31)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86	x1 x1 x x x x x x x	0.11 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89				(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling	38.14 23.92 5.95 29.51	2.6		0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 x x x x x x x x x x x x x x x x x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area	38.14 23.92 5.95 29.51 elements, m²	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43		paragraph		(27) (28) (29) (29) (29) (31) (32) (32a (32b)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	2.6 0 0 effective wiinternal wali	indow U-va	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06	x1 x1 xx xx xx xx xx xx xx atted using	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0	as given in		39.42	(27) (28) (29) (29) (29) (29) (31) (32)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A x k)	2.6 0 0 effective wiinternal wall	indow U-ve	0.65 14.36 17.56 21.32 5.95 29.51 111.86 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx xx xx xx x	0.11 0.15 0.15 0.15 0.15	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0				(27) (28) (29) (29) (29) (29) (31) (32) (32a)
Walls Type1 Walls Type2 Walls Type3 Walls Type4 Total area of e Party wall Party floor Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	38.14 23.92 5.95 29.51 elements, m² roof windows, use as on both sides of ss, W/K = S (A)	effective with internal wall x U)	indow U-va lls and par	0.65 14.36 17.56 21.32 5.95 29.51 111.8i 12.35 61.7 76.06 alue calculatitions	x1 x1 x1 xx xx xx xx xx xx xx ated using	0.11 0.15 0.15 0.15 0.15 0.15 0.16 0.17 0.17	0.04] = [0.74 1.5796 2.63 3.2 0.89 4.43 0 (a) (a) (b) (a) (a) (b) (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c		(32e) =	39.42	(27) (28) (29) (29) (29) (31) (32) (32a)

can be u	sed instea	ad of a de	tailed calc	ulation.										
Therma	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix I	K						18.24	(36)
if details	of therma	l bridging	are not kn	own (36) =	= 0.15 x (3	:1)								` ′
Total fa	abric hea	at loss							(33) +	(36) =			57.66	(37)
Ventila	tion hea	it loss ca	alculated	monthly	y				(38)m	= 0.33 × ((25)m x (5))	_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m		_	
(39)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24		
Heat lo	ss para	meter (H	HLP), W/	/m²K				_		Average = = (39)m ÷	: Sum(39) ₁ - (4)	12 /12=	73.62	(39)
(40)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	: Sum(40)₁	12 /12=	0.97	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		.38]	(42)
Annual Reduce	averag the annua	e hot wa Il average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target c).82]	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Hot wate					Vd,m = fa				ОСР	000	1101	_ <u></u>	J	
(44)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	1	
` ′ [<u> </u>	<u> </u>	<u> </u>	<u> </u>		I Total = Su	ım(44) ₁₁₂ :	<u> </u>	1089.8	(44)
Energy c	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
If in a taunt				-f /				h (40		Total = Su	ım(45) ₁₁₂ :	=	1428.9	(45)
г								boxes (46				ī	1	(10)
(46)m= Water s	22.22 storage	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52]	(46)
	_		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
_		` ,		•	/elling, e		_						J	, ,
	•	•			•			ombi boil	ers) ente	er '0' in ((47)			
	storage												-	
•					or is kno	wn (kWł	n/day):					0	<u> </u>	(48)
•			m Table									0	Į	(49)
• • • • • • • • • • • • • • • • • • • •			storage	-		or io pot	knows	(48) x (49)) =		1	10]	(50)
Hot wa	ter stora	age loss		om Tabl	loss fact le 2 (kW						0	.02]	(51)
	•	from Tal		JII 7.J							1	.03	1	(52)
			m Table	2b							-	0.6	†	(53)
													_	

Energy lost from water storage, kWh/year	(47) x (51) x (52	2) x (53) =	1.03	(54)
Enter (50) or (54) in (55)			1.03	(55)
Water storage loss calculated for each month	((56)m = (55) ×	(41)m		
	32.01 32.01 30.9		0.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H1	11)] ÷ (50), else (57)m =	(56)m where (H11) is from Append	x H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98	32.01 32.01 30.9	98 32.01 3	0.98 32.01	(57)
Primary circuit loss (annual) from Table 3			0	(58)
Primary circuit loss calculated for each month (59) m = (58)	, , ,			
(modified by factor from Table H5 if there is solar water			<u> </u>	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51	23.26 23.26 22.5	51 23.26 2	2.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365	5 × (41)m			
(61)m= 0 0 0 0 0 0	0 0 0	0	0 0	(61)
Total heat required for water heating calculated for each	month (62) m = 0.85	5 × (45)m + (46	s)m + (57)m +	(59)m + (61)m
(62)m= 203.42 179.5 188.98 170.06 167.13 150.01	144.71 157.91 157.	.35 176.31 18	85.61 198.75	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative	e quantity) (enter '0' if no	solar contribution t	to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, s	see Appendix G)			
(63)m= 0 0 0 0 0 0	0 0 0	0	0 0	(63)
Output from water heater				
(64)m= 203.42 179.5 188.98 170.06 167.13 150.01	144.71 157.91 157.	.35 176.31 18	85.61 198.75	
	Output from	m water heater (ar	nnual) ₁₁₂	2079.74 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 ×	(45)m + (61)m] + 0).8 x [(46)m + (57)m + (59)m	1
ο · · · · · · · · · · · · · · · · · · ·	\	[() (()	1
	73.96 78.35 77.3		6.72 91.93	(65)
	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in cylinder is included (57)m i	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is i	73.96 78.35 77.3 in the dwelling or ho	33 84.47 8 ot water is from	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in cylinder is inclu	73.96 78.35 77.3 in the dwelling or ho	33 84.47 8 ot water is from	91.93 on community h	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (57)m i	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119	33 84.47 8 ot water is from ep Oct .19 119.19 11	6.72 91.93 n community h	(65) eating
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder i	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119	33 84.47 8 ot water is from ep Oct .19 119.19 11	6.72 91.93 n community h	(65) eating
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m only if cylinder is included (57)m only if cylinder is included in Special States (55)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119. L9a), also see Table 7.01 9.12 12.3	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1	91.93 n community h	(65) eating (66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included in calculated in the cylinder is included in the cylinder in the cylinder is included in the cylinder is included in the cylinder is included in the cylinder in the cylinder is included in the cylinder is included in the cylinder in the cylinder is included in the cylinder in the cylinder is included in the cylinder in the cylinder in the cylinder in the cylinder in the cylind	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119. L9a), also see Table 7.01 9.12 12.3	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5	91.93 n community h	(65) eating (66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m only if cylinder is included (57)m. 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 <td>73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161</td> <td>33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18</td> <td>Nov Dec 19.19 119.19 19.33</td> <td>(65) eating (66) (67)</td>	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18	Nov Dec 19.19 119.19 19.33	(65) eating (66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculated in Sand 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19	73.96 78.35 77.3 in the dwelling or hold 19.19 119.19 119.19 12.3 3 or L13a), also see Table 157.86 155.67 161. Ir L15a), also see Table 157.86 155.67 161.	able 5	Nov Dec 19.19 119.19 8.14 19.33 187.76 201.7	(65) eating (66) (67) (68)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m only if cylinder is included (57)m. 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 <td>73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161</td> <td>able 5</td> <td>Nov Dec 19.19 119.19 19.33</td> <td>(65) eating (66) (67)</td>	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161	able 5	Nov Dec 19.19 119.19 19.33	(65) eating (66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 1	73.96 78.35 77.3 in the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling fro	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 14.92 34.92 34.92	(65) eating (66) (67) (68) (69)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculated in Sand 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19	73.96 78.35 77.3 in the dwelling or hold 19.19 119.19 119.19 12.3 3 or L13a), also see Table 157.86 155.67 161. Ir L15a), also see Table 157.86 155.67 161.	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 8.14 19.33 187.76 201.7	(65) eating (66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Solution	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161 or L15a), also see Table 34.92 34.92 34.9	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 1201.7 14.92 34.92 0 0	(65) eating (66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5). Metabolic gains (Fable 5), Watts Jan Feb Mar Apr May Jun (66)m Included Incl	73.96 78.35 77.3 in the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling fro	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 14.92 34.92 34.92	(65) eating (66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Jan Feb Mar Apr May Jun	73.96	able 5 92 34.92 3 0 0 0 0.35 -95.35 -9	Nov Dec 19.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70) (71)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5), Watts Jan	73.96	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 .24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3 0 0 .35 -95.35 -9 7.4 113.53 12	Nov Dec 19.19 119.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Jan	73.96	able 5 92 34.92 3 0 0 0 35 -95.35 -9 7.4 113.53 12 m + (70)m + (71)m	91.93 n community h Nov Dec 19.19 119.19 8.14 19.33 87.76 201.7 4.92 34.92 0 0 95.35 -95.35 20.45 123.56 1 + (72)m	(65) eating (66) (67) (68) (69) (70) (71) (72)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5), Watts Jan	73.96	able 5 92 34.92 3 0 0 0 35 -95.35 -9 7.4 113.53 12 m + (70)m + (71)m	Nov Dec 19.19 119.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southwest ₀	• • • • • • • • • • • • • • • • • • • •	X	0.6	35	x	10	04.39			0.24	x	0.7	=	7.9	(79)
Southwest ₀	.9x 0.77	x	5.5	51	x	9	2.85]		0.24	x	0.7	=	59.56	(79)
Southwest ₀	.9x 0.77	x	0.6	35	x	9	2.85			0.24	x	0.7	=	7.03	(79)
Southwest ₀	.9x 0.77	x	5.5	51	x	6	9.27]		0.24	x [0.7	=	44.43	(79)
Southwest ₀	.9x 0.77	x	0.6	35	x	6	9.27]		0.24	x [0.7	=	5.24	(79)
Southwest ₀	.9x 0.77	x	5.5	51	x	4	4.07]		0.24	x [0.7	=	28.27	(79)
Southwesto	.9x 0.77	x	0.6	65	x	4	4.07]		0.24	x [0.7	=	3.34	(79)
Southwest ₀	.9x 0.77	х	5.5	51	x	3	1.49]		0.24	x [0.7	=	20.2	(79)
Southwest ₀	.9x 0.77	x	0.6	35	x	3	1.49			0.24	x [0.7	=	2.38	(79)
Solar gain:	s in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
` ′	.33 83.51	130.97	190.29	238.71		18.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains	s – internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts								
(84)m= 459	9.55 495.72	530.19	568.54	595.68	58	34.66	557.68	525	.64	490.82	457.56	440.55	441.4		(84)
7. Mean i	nternal tem	perature	(heating	season)										
Tempera	ture during l	neating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisation	factor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)								
J	an Feb	Mar	Apr	May	,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m=	1 1	0.99	0.97	0.9	С).74	0.56	0.6	52	0.86	0.98	1	1		(86)
Mean inte	ernal tempe	rature in	living ar	ea T1 (fo	ollo	w ste	ps 3 to 7	7 in T	able	e 9c)				•	
	.99 20.1	20.29	20.57	20.82	_	0.96	20.99	20.9		20.9	20.6	20.25	19.97		(87)
Tompore	ture during l	nooting p	oriodo ir	root of	طيد	allina	from To	hla (2 (°C)		1			
·—	.09 20.1	20.1	20.11	20.11	_	0.12	20.12	20.	_	20.12	20.11	20.11	20.1		(88)
` '	I			<u> </u>				<u> </u>	·- I			1			(==)
	factor for g	1			_	<u> </u>	r	É	1	0.0	0.07	1		l	(00)
(==)	1 1	0.99	0.96	0.87		0.66	0.46	0.5		0.8	0.97	0.99	1		(89)
	ernal tempe				_				$\overline{}$			_	1	I	
(90)m= 18	.74 18.9	19.18	19.59	19.92	2	0.09	20.12	20.	12	20.03	19.63	19.13	18.72		(90)
										f	LA = Liv	ng area ÷ (4) =	0.26	(91)
Mean inte	ernal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 19	.06 19.2	19.47	19.84	20.15	2	0.32	20.34	20.3	34	20.25	19.88	19.42	19.04		(92)
Apply adj	ustment to t	_	interna	temper	_			4e,	whe	re appro	priate			•	
(93)m= 19	.06 19.2	19.47	19.84	20.15	2	0.32	20.34	20.	34	20.25	19.88	19.42	19.04		(93)
•	heating req														
	the mean in tion factor f				ed	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-cald	culate	
	an Feb	Mar	Apr	May	Г	Jun	Jul	ΙΔι	ug	Sep	Oct	Nov	Dec		
	factor for g		•	iviay	<u></u>	Juli	Jui		ug į	Оер	Oct	1100	Dec		
	1 0.99	0.99	0.96	0.87	C	0.68	0.48	0.5	54	0.81	0.97	0.99	1		(94)
	ins, hmGm	. W = (94		L 4)m	<u> </u>		<u> </u>								
	7.75 492.4	522.36	543.92	518.18	39	96.76	269.39	281	.48	398.9	441.56	437.05	440.01		(95)
Monthly a	verage exte	ernal tem	perature	from T	able	e 8	1				I	_1		1	
(96)m= 4	.3 4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m]			•	
(97)m= 110	6.97 1069.98	967.54	805.76	620.97	41	14.55	271.47	285	.14	448.72	681.83	909.67	1101.74		(97)
														-	

(98)m= 483.02 388.13 331.21 188.52 76.47 0 0 0 178.77 340.28 492.33		
Total per year (kWh/year) = Sum(98) _{15,912} =	2478.73	(98)
Space heating requirement in kWh/m²/year	32.59	(99)
8c. Space cooling requirement		
Calculated for June, July and August. See Table 10b		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 681.81 536.74 549.81 0 0 0 0		(100)
(100)m= 0 0 0 0 681.81 536.74 549.81 0 0 0 0 Utilisation factor for loss hm		(100)
(101)m= 0 0 0 0 0 0.9 0.95 0.93 0 0 0 0		(101)
Useful loss, hmLm (Watts) = (100)m x (101)m		, ,
(102)m= 0 0 0 0 0 610.8 509.45 512.46 0 0 0		(102)
Gains (solar gains calculated for applicable weather region, see Table 10)		
(103)m= 0 0 0 0 0 759.25 726.17 689.83 0 0 0		(103)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103) m – (102) m] x (4 set (104) m to zero if (104) m < 3 \times (98) m	1)m	
(104)m= 0 0 0 0 0 106.88 161.24 131.96 0 0 0		
Total = Sum(104) =	400.08	(104)
Cooled fraction $f C = \text{cooled area} \div (4) =$	0.59	(105)
Intermittency factor (Table 10b) (106)m= 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0		
Total = Sum(104) =	0	(106)
Space cooling requirement for month = (104) m × (105) × (106) m		(,
(107)m= 0 0 0 0 0 15.63 23.58 19.3 0 0 0		
Total = Sum(1,0.7) =	58.52	(107)
Space cooling requirement in kWh/m²/year $(107) \div (4) =$	0.77	(108)
9b. Energy requirements – Community heating scheme		
This part is used for space heating, space cooling or water heating provided by a community scheme.		7(204)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) =	1	(301)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the least sources is the least source of the several sources.	1	=
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) =	1	=
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.	1 atter	(302)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP	1 ntter 0.13	(302) (303a)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2	1 0.13 0.87	(302) (303a) (303b)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP (302) x (303a) =	1 0.13 0.87 0.13	(302) (303a) (303b) (304a)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2	1 0.13 0.87 0.13 0.87	(302) (303a) (303b) (304a) (304b)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system	1 0.13 0.87 0.13 0.87 1	(302) (303a) (303b) (304a) (304b) (305) (306)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system	1 0.13 0.87 0.13 0.87 1 1.05	(302) (303a) (303b) (304a) (304b) (305) (306)

Space heat from heat source 2		(98) x (304b) x	x (305) x (306) =	2264.32	(307b)
Efficiency of secondary/supplemen	tary heating system in % (0	」` ′ │(308
Space heating requirement from se			•	0	」` ☐(309)
	,	, , , , , , , , , , , , , , , , , , , ,	,		」` ′
Water heating Annual water heating requirement				2079.74	7
If DHW from community scheme:		(0.4) (0.00.)	(0.05) (0.00)		
Water heat from Community CHP			((305) x (306) =	283.88	(310a)
Water heat from heat source 2			((305) x (306) =	1899.84	(310b)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =		(313)
Cooling System Energy Efficiency I				4.73	(314)
Space cooling (if there is a fixed co		$= (107) \div (314)$) =	12.38	(315)
Electricity for pumps and fans withi mechanical ventilation - balanced,	O (m outside		162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (330	0b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Ap	opendix L)			332.22	(332)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
					_
Heat efficiency of CHP unit				63	(362)
Heat efficiency of CHP unit		Energy kWh/year	Emission factor		(362)
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	•		Emissions	(362)
		kWh/year	kg CO2/kWh	Emissions kg CO2/year	_
Space heating from CHP)		kWh/year 537.06 ×	kg CO2/kWh	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year 537.06 × 164.34 ×	0.22 0.52	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	537.06 × 164.34 × 450.61 ×	0.22 0.52 0.22 0.52	116 -85.29 97.33	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 537.06 × 164.34 × 450.61 × 137.89 ×	0.22 0.52 0.22 0.52	Emissions kg CO2/year 116 -85.29 97.33 -71.56	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 537.06 × 164.34 × 450.61 × 137.89 × sing two fuels repeat (363) to	kg CO2/kWh 0.22 0.52 0.22 0.52 0.62 0.652	116 -85.29 97.33 -71.56	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 537.06 × 164.34 × 450.61 × 137.89 × sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh 0.22 0.52 0.52 0.52 0.652 0.22 0.52 0.52	### CO2/year 116 -85.29 97.33 -71.56 96.7 = 930.15	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) If the systems	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.652 0.22 0.52 0.52	### Color	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) If the contact of t	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	Prince Pr	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the control of t	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	### Color	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the control of t	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	### State	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from ime Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the control of t	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	FEMISSIONS RG CO2/year 116 -85.29 97.33 -71.56 96.7 = 930.15 = 24.84 = 1011.48 = 0 = 0 1011.48	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with space cooling	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the control of t	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.52 0.52	### Color	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

16.76 (384) 85.89 (385)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 2-	1-Clean				
Address: 1. Overall dwelling dime	oncione:								
1. Overall dwelling diffie	#1151U115.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) -	74.06	(4)			_		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = Ī	0	x2	20 =	0	(6b)
Number of intermittent fa	ins				0	x ²	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ²	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_				_	
		_	<i>(</i> _)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(/ , ,			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ea		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
- 	• •	•	-	-	-	-		•	

Adjusted infiltr	ation rate (a	allowin	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0).16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effe		-	ate for t	he appli	cable ca	se	•	!	•				
	al ventilation		- d'a N. (O	OL) (00 ·		(/	NEW - de-		\ (00-\		ļ	0.5	(23a
If exhaust air h) = (23a)		ļ	0.5	(23k
	h heat recovery		-	_								76.5	(230
a) If balance						- 	- 	í `	r Ó Ó		r ` ´	÷ 100]	(0.4
(24a)m= 0.28	ļ l).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(248
b) If balance						, , `	MV) (24k	í `	2b)m + (2	<u> </u>			
(24b)m= 0		0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h if (22b)r	nouse extrac n < 0.5 × (23								.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilation on the contract ventilation of the contract ventilation ventilation of the contract ventilation ve								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate	e - ent	ter (24a	or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28	0.28 0).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losse	s and heat l	loss pa	aramete	er:			•						
ELEMENT	Gross area (m²		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/l	<)	k-value kJ/m²-ł		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type	e 4				0.65	x1	/[1/(1.2)+	0.04] =	0.74	=			(27)
Walls Type1	67.78	7 1	20.58	3	47.2	x	0.15	i	7.08	<u> </u>			(29)
Walls Type2	24.47	7	2.6		21.87	=	0.15	=	3.28	=			(29)
Walls Type3	5.93	╡╏	0	=	5.93	=	0.15	=	0.89	-		7 H	(29)
Total area of e		 2			98.18	=	00		0.00				(31)
Party wall	, , , , , , , , , , , , , , , , , , , ,				12.38	=	0		0	– [(32)
Party floor						=			U			╡┝	(32)
					74.06	=						-	
-					. /// ()/-) I				L			(32)
Party ceiling	I roof windows	uso off	factiva wi	ndow II v	74.06		a formula 1	/[/1/ L val	10 1 1 0 0 1 1 0	e aivon in	naraaranh	22	
-					alue calcul		g formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	n paragraph	3.2	
Party ceiling * for windows and ** include the area	as on both side	es of inte	ernal wali		alue calcul		g formula 1 (26)(30		ıe)+0.04] a	s given in	n paragraph	37.93	(33)
Party ceiling * for windows and ** include the area Fabric heat los	as on both side ss, W/K = S	es of inte	ernal wali		alue calcul) + (32) =	ue)+0.04] a				=
Party ceiling * for windows and	as on both side ss, W/K = S Cm = S(A x	es of inte (A x U (k)	ernal wali J)	ls and par	alue calcul titions	lated using) + (32) = ((28).		2) + (32a).		37.93	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both side ss, W/K = S Cm = S(A x s parameter sments where is	es of into (A x U (k) (TMP the deta	ernal wali J) = Cm ÷	s and par - TFA) ir	alue calcul titions	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	as on both side ss, W/K = S Cm = S(A x s parameter sments where is ead of a detailed	es of into (A x U (k) (TMP the detailed calcul	ernal wall J) = Cm ÷ ails of the lation.	s and par - TFA) ir construct	alue calcul titions n kJ/m²K ion are no	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(33) 1 (34) (35)

Total fabric heat	loss						(33) +	(36) =		İ	48.97	(37)
Ventilation heat I		d monthly	V					, ,	25)m x (5)		40.97	(07)
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	17.59 17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat transfer coe	efficient, W/K				I		(39)m	= (37) + (37)	38)m		l	
(39)m= 66.77 6	66.57 66.36	65.35	65.15	64.14	64.14	63.93	64.54	65.15	65.55	65.96		
Heat loss parame	eter (HLP), W	/m²K			•	•		Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	65.3	(39)
(40)m= 0.9	0.9 0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
Number of days	in month (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28 31	30	31	30	31	31	30	31	30	31		(41)
	•	•	•	•		•			•		!	
4. Water heating	g energy requ	irement:								kWh/ye	ear:	
A	NI									·	ı	
Assumed occupation of TFA > 13.9, I		: [1 - exp	(-0.0003	349 x (TF	FA -13.9)2)1 + 0.0	0013 x (ΓFA -13.		34		(42)
if TFA £ 13.9, I			((11		,_,,	(-,			
Annual average I								o toract o		.79		(43)
Reduce the annual a not more that 125 litr	-			_	-	io acriieve	a water us	se largel o	I			
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in lit			,				ОСР	001	1404	DCC		
(44)m= 98.77 S	95.17 91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
. ,	I	l					-	Γotal = Su	I m(44) ₁₁₂ =		1077.45	(44)
Energy content of ho	t water used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 146.47 1	128.1 132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
If in atomic no our water	or booting at nain	t of woo /no	bot water	· otorogol	antar O in	havea (46		Γotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instantaneous water			ı		ı				T		1	(40)
(46)m= 21.97 1 Water storage los	19.22 19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Storage volume		ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community hea	` ,				_							, ,
Otherwise if no s	•		•			` '	ers) ente	er '0' in (47)			
Water storage los												
a) If manufacture			or is kno	wn (kWł	n/day):					0		(48)
Temperature fac										0		(49)
Energy lost from	_	-		!		(48) x (49)	=		1	10		(50)
b) If manufactureHot water storage		-							0	02		(51)
If community hea			0 2 (, 0, 00	• 7 /				0.	02		(01)
Volume factor fro	-								1.	03		(52)
Temperature fac	tor from Table	2b							0	.6		(53)
Energy lost from	_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter (50) or (54	1) in (55)								1.	03		(55)

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	i –	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if constant of the consta	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Append	only if controls: May 117.03 L, equation 7.53 dix L, equalication 7.53	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in Ap 14.7 (Table 5 0 n (negation 5)	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 Dee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	х	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	х	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	X	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	х	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	X	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67		0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	X	62.67		0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	X	85.75		0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	X	85.75		0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	X	106.25		0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25		0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15		0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	X	104.39		0.24	X	0.7	=	66.97	(79)

											_					_
Southwest _{0.9x}	0.77	X	0.6	S5	X	10	04.39			0.24	X	0.7	:	- <u>L</u>	7.9	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85]		0.24	X	0.7			59.56	(79)
Southwest _{0.9x}	0.77	x	0.6	35	X	9	2.85			0.24	X	0.7	-	= [7.03	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	6	9.27]		0.24	X	0.7	-	= [44.43	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	x	6	9.27]		0.24	X	0.7		- [5.24	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	4	4.07] [0.24	X	0.7		=	28.27	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	X	4	4.07]		0.24	X	0.7	-	= [3.34	(79)
Southwest _{0.9x}	0.77	х	5.5	51	x	3	1.49]		0.24	X	0.7		-	20.2	(79)
Southwest _{0.9x}	0.77	х	0.6	35	x	3	1.49			0.24	x	0.7		-	2.38	(79)
													_			
Solar gains in	watts, ca	alculated	I for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.05	5		(83)
Total gains – i	internal a	and solar	· (84)m =	= (73)m	+ (8	33)m	, watts					-				
(84)m= 453.33	489.52	524.22	562.95	590.51	57	79.86	553.11	521.	.02	485.99	452.34	434.89	435.3	8		(84)
7. Mean inte	rnal temp	erature	(heating	season)											
Temperature			, ,		<i>'</i>	area f	from Tab	ole 9,	, Th	1 (°C)				Г	21	(85)
Utilisation fac	•	•			-					,						
Jan	Feb	Mar	Apr	May	È	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec			
(86)m= 1	1	0.99	0.96	0.87	(0.68	0.51	0.5	Ť	0.82	0.97	0.99	1			(86)
Mean interna	l temper	ature in	livina ar	oa T1 /f/	مالد	w cto	ns 3 to 7	I 7 in T	able	2 00)	<u> </u>		<u>. </u>	_		
(87)m= 20.12	20.22	20.41	20.67	20.88	_	0.98	21	21		20.94	20.68	20.36	20.1			(87)
` '	<u> </u>	<u> </u>		l				<u> </u>	I			1 20.00				(- /
Temperature				i	_					<u> </u>	00.40	20.18	L 00.46	\Box		(00)
(88)m= 20.17	20.17	20.17	20.18	20.18		20.2	20.2	20.	.2	20.19	20.18	20.18	20.18	<u>'</u>		(88)
Utilisation fac	ctor for g	ains for i	rest of d	welling,	h2,	m (se	e Table	9a)						_		
(89)m= 1	0.99	0.99	0.95	0.83	().61	0.42	0.4	16	0.76	0.96	0.99	1			(89)
Mean interna	al temper	ature in	the rest	of dwelli	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)					
(90)m= 18.98	19.14	19.41	19.79	20.07	2	0.18	20.2	20.	.2	20.14	19.81	19.35	18.97	,		(90)
									•	f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	llind	a) = fl	A × T1	+ (1 -	– fl	A) x T2				_		
(92)m= 19.28	19.42	19.67	20.02	20.28	1	0.39	20.41	20.4		20.35	20.04	19.62	19.27	,		(92)
Apply adjusti	ment to t	he mean		l temper	ı atu	re fro	m Table	4e, v	whe	re appro	priate	<u> </u>	<u> </u>			
(93)m= 19.28	19.42	19.67	20.02	20.28	_	0.39	20.41	20.4	$\overline{}$	20.35	20.04	19.62	19.27	, T		(93)
8. Space hea	ating requ	uirement														
Set Ti to the	mean int	ernal ter	nperatu	re obtair	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	alcul	late	
the utilisation	factor fo	or gains	using Ta	ble 9a								1		_		
Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	C		
Utilisation fac		r			_			_				_		_		
(94)m= 1	0.99	0.98	0.95	0.84	(0.63	0.44	0.4	19	0.77	0.96	0.99	1			(94)
Useful gains	1	· `	<u> </u>		_							1		_		(0-)
(95)m= 451.4	485.81	515.02	532.37	494.54	<u> </u>	53.28	243.33	254.	.71	375.02	432.78	430.93	433.9	1		(95)
Monthly aver	1		i –	i e	_		40.5		, 1	44,	40.7	1		\neg		(06)
(96)m= 4.3	4.9	6.5	8.9	11.7	<u> </u>	14.6	16.6	16.		14.1	10.6	7.1	4.2			(96)
Heat loss rat	1				_			- `	_ _	<u> </u>	ī —	2 000 44	000 7	$\overline{}$		(97)
(97)m= 1000.34	966.7	874.16	726.52	558.89	3	71.5	244.09	256.	. 14	403.5	615.07	820.41	993.7			(31)

Spac	e heatin	g require	ement fo	or each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m=	408.42	323.16	267.2	139.79	47.88	0	0	0	0	135.63	280.42	416.5		
		-		-	-	-	-	Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2018.99	(98)
Spac	e heatin	g require	ement in	kWh/m²	² /year							[27.26	(99)
8c. S	pace co	oling req	uiremer	nt								_		
Calcu	lated fo	r June, J	luly and	August.	See Tal	ble 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat (100)m=		e Lm (ca	lculated 0	using 29	o°C inter	nal tem 602.87	perature 474.6	and exte	ernal ter	nperatur 0	e from 1	able 10)		(100)
` '		tor for lo				602.67	474.0	400.09				U		(100)
(101)m=		0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
		ımLm (V	/atts) =	1 (100)m x	L : (101)m	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>!</u>	<u>!</u>			
(102)m=		0	0	0	0	566.25	462.49	468.37	0	0	0	0		(102)
Gains	s (solar ç	gains cal	culated	for appli	cable w	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
				or month, < 3 × (98		dwelling,	continu	ous (kW	h = 0.0)24 x [(10	03)m – (102)m] x	c (41)m	
(104)m=		0	0	0	0	133.74	191.02	159.52	0	0	0	0		
					Į.	!	!		Tota	I = Sum((104)	=	484.28	(104)
	d fraction								f C =	cooled	area ÷ (4	4) =	0.6	(105)
		actor (Ta		í – –				0.05			<u> </u>			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	I = Sum((104)	0		(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	m	TOla	ı = Sum	1 .0.4)	= [0	(106)
(107)m=		0	0	0	0	20.09	28.69	23.96	0	0	0	0		
				•				•	Tota	l = Sum((107)	=	72.75	(107)
Space	cooling	requirer	nent in l	kWh/m²/y	year .				(107) ÷ (4) =		Ī	0.98	(108)
9b. En	ergy rec	quiremer	ıts – Co	mmunity	heating	scheme)					_		
								ting prov			unity sch	neme.		_
	•			•		•	•	(Table 1	1) '0' if n	ione		Į	0	(301)
Fraction	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	•					•				up to four	other heat	sources; th	ne latter	
		at from C	-		aste neat i	rom powe	r stations.	See Apper	naix C.			ſ	0.13	(303a)
				m heat s	source 2								0.87	(303b)
		•		m Comn						(3	602) x (303	a) =	0.13	(304a)
		•		m comm	•		· 2			,	602) x (303		0.87	(304b)
		•			•			unity hea	nting eve		102) X (303	υ) – [(305)
								-	illig sys	otem		Ĺ	1	믁
			(Table	12c) for (commun	ity neatii	ng syste	em				L	1.05	(306)
-	heating	g heating :	requiren	nent								Г	kWh/yea 2018.99	<u>r</u>
	•	•	•						(00) (0	040) -: (22	E) v (200)	Ĺ		
Space	neat fro	m Comr	nunity C	HP					(98) x (3	u4a) x (30	5) x (306) :	= [275.59	(307a)

					_		-
Space heat from heat source 2				$(305) \times (306) =$	L	1844.35	(307b)
Efficiency of secondary/supplemen	tary heating system in % (fror	n Table 4a or A	Appen	dix E)		0	(308
Space heating requirement from se	econdary/supplementary syste	em (98) x (3	801) x 1	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement					Г	2063.55	7
If DHW from community scheme: Water heat from Community CHP		(64) v (2	102a) v	(20E) v (20e)		004.07	
·				(305) x (306) =		281.67	(310a)
Water heat from heat source 2				(305) x (306) =		1885.05	(310b)
Electricity used for heat distribution		0.01 × [(307a))(307	e) + (310a)(310e)] = [_	42.87	(313)
Cooling System Energy Efficiency						4.73	(314)
Space cooling (if there is a fixed co	oling system, if not enter 0)	= (107) -	÷ (314)	=		15.4	(315)
Electricity for pumps and fans withi mechanical ventilation - balanced,		outside				158.57	(330a)
warm air heating system fans						0	(330b)
pump for solar water heating						0	(330g)
Total electricity for the above, kWh	/year	=(330a)	+ (330	b) + (330g) =		158.57	(331)
Energy for lighting (calculated in Ap	ppendix L)					325.25	(332)
12b. CO2 Emissions – Community	heating scheme						
Electrical efficiency of CHP unit						30.6	(361)
Heat efficiency of CHP unit						63	(362)
Heat efficiency of CHP unit		Energy kWh/year		Emission fac			(362)
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =] x			missions	(362)
·		kWh/year] ×] ×	kg CO2/kWh		missions g CO2/year	_
Space heating from CHP)		kWh/year 437.45] x] x] x	kg CO2/kWh		missions g CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	437.45 133.86] ×	0.22 0.52		missions g CO2/year 94.49 -69.47	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ (310a) × 100 ÷ (362) =	437.45 133.86 447.1 136.81] x] x] x	0.22 0.52 0.22 0.52	kç	94.49 -69.47 96.57	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using	437.45 133.86 447.1 136.81] x] x] x] x 363) to	0.22 0.52 0.22 0.52	kç	94.49 -69.47 96.57	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using	437.45 133.86 447.1 136.81 two fuels repeat (3] x] x] x] x 363) to	0.22 0.52 0.22 0.52 (366) for the second	kç d fuel	94.49 -69.47 96.57 -71.01	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP using $[(307b)+(307b) + (307b) $	437.45 133.86 447.1 136.81 two fuels repeat (3310b)] × 100 ÷ (367)] x] x] x] x 363) to 7b) x	0.22 0.52 0.52 0.52 0.52 0.52 0.52	kç d fuel =	94.49 -69.47 96.57 -71.01 96.7	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(437.45 133.86 447.1 136.81 two fuels repeat (3310b)] x 100 ÷ (367313) x] x] x] x] x 363) to 7b) x	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	kç d fuel = =	94.49 -69.47 96.57 -71.01 96.7 833.04	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on [inity systems (g (secondary) (kWh/year 437.45 133.86 447.1 136.81 two fuels repeat (3310b)] x 100 ÷ (367313) x 363)(366) + (3683309) x] x] x] x] x 363) to 7b) x	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = =	94.49 96.57 -71.01 96.7 833.04 22.25	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on	kWh/year 437.45 133.86 447.1 136.81 two fuels repeat (3310b)] x 100 ÷ (367313) x 363)(366) + (3683309) x] x] x] x 363) to 7b) x 3)(372	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = =	94.49 96.57 -71.01 96.7 833.04 22.25 905.87	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from ime Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on	437.45 133.86 447.1 136.81 two fuels repeat (3310b)] × 100 ÷ (367313) × 363)(366) + (368309) × bus heater (319861)] x] x] x 363) to 7b) x 3)(372	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.52	d fuel = = = =	94.49 96.57 -71.01 96.7 833.04 22.25 905.87 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with space cooling	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on	kWh/year 437.45 133.86 447.1 136.81 two fuels repeat (3313) x (366) + (3683)(366) + (36833)(366) + (373) x (373) + (374) + (3753315) x] x] x] x 363) to 7b) x 3)(372	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52 0.52 0.52	d fuel = = = =	94.49 96.57 -71.01 96.7 833.04 22.25 905.87 0 0 905.87	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with space cooling CO2 associated with electricity for	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on [(on ())] [(a)] [(kWh/year 437.45 133.86 447.1 136.81 two fuels repeat (3310b)] x 100 ÷ (367313) x 363)(366) + (3683309) x 50us heater (31373) + (374) + (3753315) x ag (331)) x] x] x] x 363) to 7b) x 3)(372	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = = = =	94.49 96.57 -71.01 96.7 833.04 22.25 905.87 0 0 905.87 7.99 82.3	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377) (378)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as CO2 associated with space cooling	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP using [(307b)+(on [(on ())] [(a)] [(kWh/year 437.45 133.86 447.1 136.81 two fuels repeat (3313) x (366) + (3683)(366) + (36833)(366) + (373) x (373) + (374) + (3753315) x] x] x] x 363) to 7b) x 3)(372	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52 0.52 0.52	d fuel	94.49 96.57 -71.01 96.7 833.04 22.25 905.87 0 0 905.87	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

15.73 (384) 86.89 (385)

					User [Details:						
Assessor Name: Software Name:		Hockne na FSAP		2		Strom Softwa					016363 on: 1.0.4.10	
				Р	roperty	Address	: Flat 2-2	2-Clean				
Address:	manaianai											
Overall dwelling directions	nensions.				Δro	a(m²)		Av. He	iaht(m)		Volume(m³)	
Basement						· · ·	(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA =	(1a)+(1b)+	+(1c)+(1d)+(1e)+(1r	n)	76.06	(4)					」
Dwelling volume	(-) (-)	(-) (-)	, (-	, (′ <u> </u>	0.00)+(3c)+(3d)+(3e)+	.(3n) =	197.76	(5)
-							(5.0)	, , () , (, (, , , , , , , , , , , , , , , , , ,		197.76	
2. Ventilation rate:	ma	ain	Se	econdar	У	other		total			m³ per hour	
Number of chimneys	hea	ating 0	+ h	eating 0	П + Г	0	п = Г	0	x 4	10 =	0	(6a)
Number of open flues			+		」]		x 2	20 =		
Number of intermittent	fono	0	Ĺ	0	」	0	J	0	_	10 =	0	(6b)
							Ļ	0			0	[(7a)
Number of passive ver							Ļ	0		10 =	0	(7b)
Number of flueless gas	s fires							0	X 2	10 =	0	(7c)
										Air ch	anges per ho	ur
Infiltration due to chim	nevs flues	and fans	. – (6:	a)+(6b)+(7	'a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test ha	•						continue fr			- (3) =	U](0)
Number of storeys in	n the dwelli	ing (ns)									0	(9)
Additional infiltration									[(9)-	·1]x0.1 =	0	(10)
Structural infiltration							•	ruction			0	(11)
if both types of wall are deducting areas of ope	•			oonding to	the grea	ter wall are	a (after					
If suspended woode	3 //			ed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby,	enter 0.05,	, else ente	er O								0	(13)
Percentage of windo	ws and do	ors drau	ght st	ripped							0	(14)
Window infiltration						0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate						(8) + (10)	+ (11) + (1	12) + (13) -	+ (15) =		0	(16)
Air permeability valu					•		•	etre of e	nvelope	area	3	(17)
If based on air permea	•	•						to the to a second	1		0.15	(18)
Air permeability value ap		surisation te	est nas	s been aor	ie or a de	gree air pe	rmeability	is being us	sea		3	(19)
Shelter factor	5100					(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorpo	rating shelt	ter factor				(21) = (18) x (20) =				0.12	(21)
Infiltration rate modifie	d for month	hly wind s	peed							!		_
Jan Feb	Mar	Apr I	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind	speed fron	m Table 7									-	
(22)m= 5.1 5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Footon (00 s)	(22) 1											
Wind Factor $(22a)m = (22a)m = 1.27 1.25$	ì í	1.1 1	.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(-24)7 1.23	'. <u>~</u> ~	··· '	.00	0.00	I 3.33	1 0.02	Ι '	I 1.00	'.'4	10		

0.15	0.15	0.14	0.13	0.12	0.11	0.11	(21a) x	0.12	0.12	0.13	0.14	1		
alculate effec		_	rate for t	he appli	cable ca	se			ļ			J 		_
If mechanica				(. (00)	\ (22.\				0.5	(2:
If exhaust air he) = (23a)				0.5	(23
If balanced with		-	•	_									6.5	(23
a) If balance				i		- 	- 	í `	r Ó - Ò		' ' ') ÷ 100] 7		(2
4a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J		(2
b) If balance				ı			- ^ ` ` - 	ŕ	r Ó		Ι ,	7		(2
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse ext n < 0.5 ×			•	•				5 v (23h	.)				
4c)m = 0	0.5 \(\)	0	0	0	0	0	0	1 0	0	0	0	1		(2
d) If natural		n or wh	ole hous	e nositi	/e input	ventilati	on from	loft				J		•
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
Effective air	change i	rate - er	nter (24a	or (24l	o) or (24	c) or (24	ld) in bo	x (25)				-		
5)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]		(2
B. Heat losse	s and he	at loss r	naramete	or.								_		
LEMENT	Gros	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
	area	_								•				
	arca	(1112)	m)²	A ,r	n²	W/m2	2K	(W/ł	<)	kJ/m²•	K	KJ	/K
oors	arca	(1112)	rr) *	A ,r	m² x	W/m2	2K =	(VV/F 3.12	<) 	kJ/m²•	K	KJ	
		(1112)	rr] *		x		=	` `	<) 	kJ/m²•	K	KJ	(2
indows Type	: 1	(111-)	rr	 4	2.6	x x1	1.2	= 0.04] =	3.12	<) 	kJ/m²-	K	KJ	(2
indows Type indows Type	e 1 e 2	(III -)	rr	 	3.26	x1 x1 x1	1.2 /[1/(1.2)+	= (0.04] = (0.04] =	3.12	<) 	kJ/m²-	K	КJ	(2 (2 (2
indows Type indows Type indows Type	e 1 e 2 e 3	(III -)	rr	 	2.6 3.26 3.95	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<) 	kJ/m²-	K	КJ	(2 (2 (2
indows Type indows Type indows Type indows Type	e 1 e 2 e 3		20.56		2.6 3.26 3.95 5.51	x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31	<)	kJ/m²-	ĸ	КJ	(2)
indows Type indows Type indows Type indows Type alls Type1	2 2 3 4	4			2.6 3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	<)	kJ/m²-	K	KJ	(2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2	2 2 3 4 38.14	4 2	20.56		2.6 3.26 3.95 5.51 0.65	x1 x1 x1 x1 x1 x1 x1 x2 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63	<)	kJ/m²-	K 	KJ	(2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	23.92 3.14 23.92 5.95	4 2	20.56		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	x1 x1 x1 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89		kJ/m²-	K 	KJ	(2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4	38.14 23.92 5.95 29.5	4 2 5	20.56		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	x x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2		kJ/m²-	K 	KJ	(22 (22 (22 (22 (22 (22 (22 (22 (22 (22
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.56		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5	x1 x1 x1 x	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	()	kJ/m²-	к 	KJ	
findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.57 12.38	x x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89		kJ/m²-	K 	KJ	(22 (24 (24 (24 (24 (24 (24 (24 (24 (24
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall	38.14 23.92 5.95 29.5	4 2 5	20.5 <i>i</i>		2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.52 12.38 76.06	x x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	\$) 	kJ/m²-	K	KJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor arty ceiling or windows and	23.92 23.92 23.92 29.52 29.53	4 2 3 1 m ²	20.56 2.6 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 97.52 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				KJ	
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area	23.92 23.92 23.92 23.92 29.52 29.52 29.52 29.52 29.52	4 2 1 1 m ² ows, use e	20.5i 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 97.52 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	= 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				7.84	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area fabric heat los	23.92 38.14 23.92 5.95 29.57 29.67 29.	4 2 1 1 m ² ows, use e sides of ir = S (A x	20.5i 2.6 0 0	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.5' 97.52 12.38 76.06 76.06 alue calculations	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	as given in	n paragrapi	h 3.2		
findows Type findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of earty wall earty floor earty ceiling for windows and include the area fabric heat los eat capacity formal mass	23.92 23.92 23.92 23.92 29.57 29	4 2 1 1 m ² ows, use e sides of ir = S (A x A x k)	20.50 2.6 0 0 effective winternal walk	8	2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.35 76.06 76.06 alue calculatitions	x x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	= 0.04] = 0.04	3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		n paragrapi	h 3.2	7.84	(2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (

		0 0	are not kn	own (36) =	= 0.15 x (3	1)								_
	abric hea									(36) =	,		48.84	(37)
ventila				l monthly		l .	Ι	١.	· ,	·	25)m x (5)			
(00)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		_
Heat lo	ss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) ₁ . - (4)	12 /12=	64.8	(39)
(40)m=	0.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84	0.84	0.85	0.86	0.86		
•										Average =	Sum(40) ₁	12 /12=	0.85	(40)
Numbe	r of day	s in mor	nth (Tab	le 1a)		·	,	1		T	,			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
1 Wa	tor hoat	ing ener	gy requi	iroment:								kWh/ye	or:	
4. vva	iter rieat	ing ener	gy requi	irement.								KVVII/ y C	<i>τ</i> αι.	
		pancy, N										.38		(42)
			+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
	A £ 13.9	•						(O.F. N.I.)	00					
							erage = designed t			se target o).82		(43)
		_		day (all w		_	-	o acmeve	a water us	se larger o	1			
Γ			•				<u>, </u>		0	0.1				
Hot water	Jan Tusago ir	Feb	Mar	Apr	May	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
г											1			
(44)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		– , .
Energy o	content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x C	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
•	•					•	•	•	-	Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
If instant	aneous w	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)) to (61)			•		
(46)m=	22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water	storage	loss:					•							
Storage	e volum	e (litres)	includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comn	nunity h	eating a	nd no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherw	ise if no	stored	hot wate	er (this in	cludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:												
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	storage	, kWh/ye	ear			(48) x (49)	=		1	10		(50)
b) If m	anufact	urer's de	eclared o	cylinder l	oss fact	or is not	known:							
Hot wa	ter stora	age loss	factor fr	om Tabl	e 2 (kW	h/litre/da	ay)				0.	.02		(51)
	-	•	ee secti	on 4.3										
		from Tal									1.	.03		(52)
Tempe	rature fa	actor fro	m Table	2b							0	.6		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter ((50) or (54) in (5	55)								1.	.03		(55)
,														

Water storage loss calculated for each month $((56)m = (55) \times (41)m)$	
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01	(57)
Primary circuit loss (annual) from Table 3	(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m	
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 0 0 0 0 0 0 0 0 0 0 0 0	(61)
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (62)m + (62)m + (63)m$)m
(62)m= 203.42 179.5 188.98 170.06 167.13 150.01 144.71 157.91 157.35 176.31 185.61 198.75	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	
(63)m= 0 0 0 0 0 0 0 0 0 0 0 0	(63)
Output from water heater	
(64)m= 203.42 179.5 188.98 170.06 167.13 150.01 144.71 157.91 157.35 176.31 185.61 198.75	
Output from water heater (annual) ₁₁₂ 2079.74	(64)
Heat gains from water heating, kWh/month 0.25 $'$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]	
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 73.96 78.35 77.33 84.47 86.72 91.93	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating	
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19	(66)
	(66)
(66)m= 119.19 11	(66) (67)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33	, ,
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	, ,
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7	(67)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	(67)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92	(67) (68)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92	(67) (68)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81	(67) (68) (69)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81	(67) (68) (69)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Losses e.g. evaporation (negative values) (Table 5) (71)m= -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35	(67) (68) (69) (70)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Losses e.g. evaporation (negative values) (Table 5) (71)m= -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35 -95.35	(67) (68) (69) (70)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92	(67) (68) (69) (70)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 7.01 9.12 12.24 15.54 18.14 19.33 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 157.86 155.67 161.19 172.93 187.76 201.7 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 34.92 Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

														_		_
Southwest _{0.9x}	•	x	0.6	S5	X	10	04.39			0.24	X	0.7	:	- <u>L</u>	7.9	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85]		0.24	X	0.7	-	= [59.56	(79)
Southwest _{0.9x}	0.77	X	0.6	35	X	9	2.85			0.24	X	0.7	=	= [7.03	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	6	9.27]		0.24	x	0.7	-	- [44.43	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7	:	= [5.24	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7		= [28.27	(79)
Southwest _{0.9x}	0.77	Х	0.6	35	x	4	4.07			0.24	x	0.7	-	- [3.34	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	3	1.49			0.24	х	0.7	-	• [20.2	(79)
Southwest _{0.9x}	0.77	X	0.6	35	x	3	1.49			0.24	x	0.7		• [2.38	(79)
				_												_
Solar gains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.05	5		(83)
Total gains –	internal a	nd solar	(84)m =	= (73)m	+ (8	83)m	, watts					_	_			
(84)m= 459.55	495.72	530.19	568.54	595.68	58	84.66	557.68	525.	.64	490.82	457.56	440.55	441.4	ļ.		(84)
7. Mean inte	rnal temp	erature	(heating	season)											
Temperature	e during h	eating p	eriods ir	n the livi	ng	area f	from Tab	ole 9,	, Th	1 (°C)				Г	21	(85)
Utilisation fa	_	٠.			_					,				L		
Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	c		
(86)m= 1	1	0.99	0.96	0.87	(0.68	0.5	0.5	Ť	0.82	0.97	0.99	1	7		(86)
Mean interna	al temper	atura in	livina ar	 aa T1 (f(مالد	w sta	ne 3 to 7	in T	ahle	a 0c)						
(87)m= 20.16	20.26	20.44	20.69	20.89	_	0.98	21	21		20.95	20.7	20.39	20.14			(87)
` '	<u> </u>			l	<u> </u>			<u> </u>	I							` '
Temperature (88)m= 20.19	20.2	eating p	eriods ir 20.21	20.21	_	eiiing 20.22	20.22	20.2		20.22	20.21	20.21	20.2	\neg		(88)
(88)m= 20.19	20.2	20.2	20.21	20.21		.0.22	20.22	20.4	22	20.22	20.21	20.21	20.2			(00)
Utilisation fa	, 				- 			<u> </u>				1		_		
(89)m= 1	0.99	0.99	0.95	0.83		0.6	0.41	0.4	16	0.75	0.96	0.99	1			(89)
Mean interna	al temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)	_		_		
(90)m= 19.06	19.21	19.47	19.84	20.1	2	20.21	20.22	20.2	22	20.17	19.86	19.41	19.04	L		(90)
										f	LA = Liv	ing area ÷ (4) =	L	0.26	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	llin	g) = fl	_A × T1	+ (1 -	– fL	A) × T2						
(92)m= 19.34	19.48	19.72	20.05	20.3	2	20.41	20.42	20.4	42	20.37	20.08	19.66	19.32	2		(92)
Apply adjust	ment to t	he mear	interna	temper	atu	re fro	m Table	4e, v	whe	re appro	priate	•				
(93)m= 19.34	19.48	19.72	20.05	20.3	2	20.41	20.42	20.4	42	20.37	20.08	19.66	19.32	2		(93)
8. Space he	ating requ	uirement														
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	alcu	ılate	
the utilisation	1			1	_			Π.				1	I _	_		
Jan	Feb	Mar	Apr	May		Jun	Jul	Au	ug	Sep	Oct	Nov	Dec			
Utilisation fa	0.99	0.98	0.95	0.83	Γ,	0.62	0.44	0.4	10	0.77	0.96	0.99	1	\neg		(94)
		L		<u> </u>		J.62	0.44	0.4	ю	0.77	0.96	0.99	1			(34)
Useful gains (95)m= 457.68	1	521.03	537.49	497.01	3(62.92	242.69	254.	15	376.3	437.65	436.65	439.9	٦		(95)
Monthly ave				l			242.00	204.		070.0	407.00	100.00	400.0			(00)
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	\neg		(96)
Heat loss ra				<u> </u>	_							1	L			•
(97)m= 995.46		869.97	723.39	556.33	_	70.01	243.3	255.	_ _	401.92	612.72	817.11	989.4	2		(97)
	1			<u> </u>	_				!			1	<u> </u>			

Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 400.11	315.8	259.61	133.85	44.13	0	0	0	0	130.25	273.93	408.79		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	1966.47	(98)
Space heatin	g require	ement in	kWh/m²	² /year								25.85	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo	r June, .	July and	August.	See Tal	ble 10b	1	1			ī			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate					· ·	1	ì		<u> </u>		$\overline{}$		(100)
(100)m= 0	0	0	0	0	598.91	471.48	482.78	0	0	0	0		(100)
Utilisation fac	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
Useful loss, h	_					0.50	0.07						()
(102)m = 0	0	0	0	0	566.6	461.21	467.74	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	l		<u> </u>		
(103)m= 0	0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
Space cooling set (104)m to			-		dwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
(104)m= 0	0	0	0	0	138.71	197.13	165.24	0	0	0	0		
									l = Sum(,	= [501.07	(104)
Cooled fraction		-l-l- 40h	`					f C =	cooled	area ÷ (4	4) =	0.59	(105)
Intermittency for (106)m= 0	actor (1		0	0	0.25	0.25	0.25	0	0	0	0		
(100)					0.20	0.20	0.20		l = Sum(l	=	0	(106)
Space cooling	require	ment for	month =	: (104)m	× (105)	× (106)r	m			-086-7	L		(/
(107)m= 0	0	0	0	0	20.29	28.83	24.17	0	0	0	0		
								Tota	l = Sum(107)	=	73.29	(107)
Space cooling	require	ment in k	دWh/m²/y	/ear				(107)) ÷ (4) =		Γ	0.96	(108)
9b. Energy red	luiremer	nts – Coi	mmunity	heating	scheme)					_		
This part is use										unity scł	neme.		- 1
Fraction of spa	ice heat	from se	condary	/supplen	nentary I	heating	(Table 1	1) '0' if n	one		Ĺ	0	(301)
Fraction of spa	ce heat	from co	mmunity	system	1 – (30	1) =					L	1	(302)
The community so includes boilers, h									up to four	other heat	sources; the	e latter	
Fraction of hea	at from C	Commun	ity CHP									0.13	(303a
Fraction of cor	nmunity	heat fro	m heat s	source 2							Γ	0.87	(303b
Fraction of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	12c) for (commun	ity heati	ng syste	m					1.05	(306)
Space heating	3										_	kWh/yea	r
Annual space	heating	requiren	nent									1966.47	
Space heat fro	m Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	<u> </u>	268.42	(307a)
											<u> </u>		_

				,,	_		7
Space heat from heat source 2				(305) x (306) =	Ļ	1796.37	(307b)
Efficiency of secondary/supplementary heating s	system in % (from Ta	able 4a or A	Appen	dix E)		0	(308
Space heating requirement from secondary/sup	plementary system	(98) x (3	01) x 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement					Г	2079.74	7
If DHW from community scheme:				,,			- 7
Water heat from Community CHP				(305) x (306) =	Ļ	283.88	(310a)
Water heat from heat source 2				(305) x (306) =	Ļ	1899.84	(310b)
Electricity used for heat distribution		0.01 × [(307a)	(3076	e) + (310a)(310e)] =	42.49	(313)
Cooling System Energy Efficiency Ratio						4.73	(314)
Space cooling (if there is a fixed cooling system,	, if not enter 0)	= (107) -	÷ (314)	=		15.51	(315)
Electricity for pumps and fans within dwelling (Tamechanical ventilation - balanced, extract or pos		side				162.85	(330a)
warm air heating system fans						0	(330b)
pump for solar water heating						0	(330g)
Total electricity for the above, kWh/year		=(330a)	+ (330b	o) + (330g) =		162.85	(331)
Energy for lighting (calculated in Appendix L)					Ē	332.22	(332)
12b. CO2 Emissions – Community heating sche	me						
Electrical efficiency of CHP unit						30.6	(361)
Heat efficiency of CHP unit							7(200)
•						63	(362)
·		Energy kWh/year		Emission fac			<u>]</u> (362)
Space heating from CHP) (307a) × 100 ÷			x			missions	(362)
	· (362) =	kWh/year] x	kg CO2/kWh		missions g CO2/year	_
Space heating from CHP) (307a) × 100 ÷	· (362) =) ÷ (362) =	kWh/year 426.07] x] x	kg CO2/kWh		missions g CO2/year	(363)
Space heating from CHP) (307a) \times 100 \div less credit emissions for electricity $-(307a) \times (361a) \times $	· (362) =) ÷ (362) = · (362) =	426.07 130.38	x	0.22 0.52		missions g CO2/year 92.03	(363) (364)
Space heating from CHP) $(307a) \times 100 \div$ less credit emissions for electricity $-(307a) \times (361)$ Water heated by CHP $(310a) \times 100 \div$ less credit emissions for electricity $-(310a) \times (361)$	· (362) =) ÷ (362) = · (362) =	426.07 130.38 450.61 137.89	x x x	0.22 0.52 0.22 0.52	kç	92.03 -67.67	(363) (364) (365)
Space heating from CHP) $(307a) \times 100 \div$ less credit emissions for electricity $-(307a) \times (361)$ Water heated by CHP $(310a) \times 100 \div$ less credit emissions for electricity $-(310a) \times (361)$	· (362) =) ÷ (362) = · (362) =) ÷ (362) =	426.07 130.38 450.61 137.89 fuels repeat (3	x x x x x	0.22 0.52 0.22 0.52	kç	92.03 -67.67 97.33	(363) (364) (365) (366)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%)	· (362) =) ÷ (362) = · (362) =) ÷ (362) = f there is CHP using two	426.07 130.38 450.61 137.89 fuels repeat (367) 3)] x 100 ÷ (367)	x x x x x	0.22 0.52 0.52 0.52 (366) for the secon	kç d fuel	92.03 -67.67 97.33 -71.56	(363) (364) (365) (366) (367b)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2	(362) =) ÷ (362) = (362) =) ÷ (362) = f there is CHP using two [(307b)+(310b)]	426.07 130.38 450.61 137.89 fuels repeat (367) 3)] x 100 ÷ (367)	x x x x x x x x x x x x x x x x x x x	0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	kç d fuel =	92.03 -67.67 97.33 -71.56 96.7 825.63	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	(362) =) ÷ (362) = (362) =) ÷ (362) = f there is CHP using two [(307b)+(310b) [(313)]	426.07 130.38 450.61 137.89 fuels repeat (367)) x 100 ÷ (367)) x (366) + (368)	x x x x x x x x x x x x x x x x x x x	0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	kç d fuel = =	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems	(362) =) ÷ (362) = (362) =) ÷ (362) = f there is CHP using two [(307b)+(310b) [(313) (363) (309)	426.07 130.38 450.61 137.89 fuels repeat (367)) x 100 ÷ (367) x(366) + (368)	x x x x x x x x x x x x x x x x x x x	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = =	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	(362) =) ÷ (362) = (362) =) ÷ (362) =) ÷ (362) = If there is CHP using two [(307b)+(310b) [(313) (363) (309) Iter or instantaneous	426.07 130.38 450.61 137.89 fuels repeat (367)) x 100 ÷ (367) x(366) + (368)	X	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = =	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05 897.81	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heat	(362) =) ÷ (362) = (362) =) ÷ (362) =) ÷ (362) = If there is CHP using two [(307b)+(310b) [(313) (363) (309) Iter or instantaneous	426.07 130.38 450.61 137.89 fuels repeat (367) 100 ÷ (367) 100 ×	X	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = =	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05 897.81 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heat Total CO2 associated with space and water heat	(362) = (362) = (362) = (362) = (362) = (363) = (307b)+(310b) (363) (309) (309) (307) (313) (315)	426.07 130.38 450.61 137.89 fuels repeat (367) 10) x 100 ÷ (367) 10) x 100 × (366) + (368) 100 × (366) + (366) 100 × (366) + (366) 100 × (366) + (366) 100 × (366) + (366) 100 × (366) 100 × (366) 100 × (366	X	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22	d fuel = = = = = =	92.03 92.03 -67.67 97.33 -71.56 96.7 825.63 22.05 897.81 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) (307a) × 100 ÷ less credit emissions for electricity -(307a) × (361) Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heat Total CO2 associated with space and water heat CO2 associated with space cooling	(362) =) ÷ (362) = (362) =) ÷ (362) = If there is CHP using two [(307b)+(310b) [(313) (363) (309) Iter or instantaneous Iting (373) (315) Items within dwelling	426.07 130.38 450.61 137.89 fuels repeat (367) 1	X	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	d fuel = = = = = =	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05 897.81 0 0 897.81 8.05	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377) (378)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity -(307a) × (361 Water heated by CHP (310a) × 100 ÷ less credit emissions for electricity -(310a) × (361 Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heat Total CO2 associated with space and water heat CO2 associated with space cooling CO2 associated with electricity for pumps and factors CO2 associated with electricity for lighting	(362) = (362) = (362) = (362) = (362) = (363) = (307b)+(310b) (363) (309) (309) (307) (313) (315)	426.07 130.38 450.61 137.89 fuels repeat (367) 1	X	kg CO2/kWh 0.22 0.52 0.52 0.52 366) for the secon 0.22 0.52 0.52 0.52	d fuel	92.03 -67.67 97.33 -71.56 96.7 825.63 22.05 897.81 0 0 897.81 8.05	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

15.29 (384) 87.13 (385)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 3-	1-Clean				
Address: 1. Overall dwelling dime	pneione:								
1. Overall awelling unite	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.06	(4)			•		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	7 + [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	<u> </u>	0		20 =	0	(6b)
Number of intermittent fa	ins				0	x ′	10 =	0	(7a)
Number of passive vents	;			Ē	0	x	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_				_	
		_	<i>(</i> _)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(peen carried out or is intended, proceed			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(/ , ,			o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o irie grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	P x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metre	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.13	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
	• •			_	_	-		-	

Adjusted infiltr	ation rate	(allowi	ing for sl	nelter ar	nd wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effect		_	rate for t	he appli	cable ca	se	•	•	•	•		_	
If mechanica			andiv N. (C	12h) - (22	a) v Emy (aguatian (VEVV otho	muiaa (22h	·) - (22a)			0.5	(23
If exhaust air h									i) = (23a)			0.5	(23)
If balanced with		-	-	_					Ola \	005) [4 (00-	76.5	(230
a) If balance (24a)m= 0.28			0.26	0.25	at recov	0.24	HR) (248	a)m = (2) 0.24	2b)m + (2 0.25	23b) × [0.26	- ` ` `) ÷ 100] 1	(24
	0.28	0.27		ļ	ļ	l	<u>Į</u>	Į		l	0.27	J	(240
b) If balance	ed mecha	nicai ve	entilation 0	without	neat red	overy (i	r ´ ` 	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	2b)m + (2 0	23b) 0	Ι ,	1	(24
(=)							0			0	0	J	(24)
c) If whole h	ouse extr			•	•				.5 × (23b)	_	-	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n	ventilation				•				0.5]			_	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change r	ate - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)	-	-	-	_	
(25)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(25)
3. Heat losse	s and hea	at loss i	naramet	er.								_	
ELEMENT	Gross area (S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/ł	<)	k-valu kJ/m²·		A X k kJ/K
Doors					2.6	x	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	一			(27)
Windows Type	2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type	e 4				0.65		/[1/(1.2)+	0.04] =	0.74	Ħ			(27)
Walls Type1		$\overline{}$	20.5	8	47.2	=	0.15		7.08	=			(29)
Walls Type2	24.47	=	2.6		21.87	=	0.15	_	3.28	=		= =	(29)
Walls Type3	5.93		0	=	5.93	=	0.15	=	0.89	╡ ¦			(29)
Roof		=	0	=		=				륵 ¦		-	(30)
Total area of e	19.72				19.72	=	0.15		2.96				
	dernents,	***			117.9	=				i			(31)
Party wall					12.38	=	0	=	0				(32)
Party floor					74.06	=							(32
Party ceiling * for windows and	roof windo	ws, use e	effective wi	ndow U-v	54.34 alue calcul		g formula 1	/[(1/U-valu	ле)+0.04] а	s given ir	n paragrapi		(32)
** include the area	as on both s	sides of ir	nternal wal	ls and par	titions								
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30) + (32) =				40.89	(33)
Heat capacity	Cm = S(A)	Axk)						((28).	(30) + (32	2) + (32a)	(32e) =	26033.88	(34)
Thermal mass	paramet	er (TMF	⊃ = Cm -	: TFA) iı	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
For design assess				construct	tion are no	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f		
can be used inch													
can be used inste Thermal bridge				usina Ar	nendiv I	K						22.81	(36

	of therma	0 0	are not kn	own (36) =	= 0.15 x (3	1)			(00)	(0.0)				_
	abric hea		. 4	l a .a 41a 1a	_				` '	(36) =	(OE) (E)		63.71	(37)
ventila	ation hea								` ′	·	25)m x (5)			
(20)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(29)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat to	ransfer c	oefficier	nt, W/K					•	(39)m	= (37) + (38)m		ı	
(39)m=	81.5	81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		_
∐oot k	oce para	motor (L	JI D) \\//	/m2k/						Average = = (39)m ÷	Sum(39) ₁	12 /12=	80.03	(39)
(40)m=	oss para	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.08	1.09		
(40)111=	'.'	1.1	1.1	1.00	1.00	1.00	1.00	1.00			Sum(40) ₁		1.08	(40)
Numbe	er of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40)1.	12 / 12-	1.00	(,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
											<u> </u>	l		
1 \//-	ater heat	ing one	av roqui	iromont:								kWh/ye	or:	
- 1 . vvc	ater rieat	ing ener	gy requi	nement.								KVVII/ y C	<i>-</i> ai.	
	ned occu								_			34		(42)
	A > 13.9 A £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
		,	ater usac	ne in litre	es ner da	av Vd av	erage =	(25 x N)	+ 36		00	0.79		(43)
	_			•	•		designed t	` ,		se target o		1.79		(43)
not more	e that 125	litres per p	oerson per	day (all w	ater use, l	hot and co	old)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)					'	
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Cnora.	contont of	hat water	used sel	outoted m	anthly 1	100 × Vd *		Tm / 2600			m(44) ₁₁₂ =		1077.45	(44)
-				i		·	m x nm x D ı	1		,			ſ	
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		_
If instan	taneous w	ater heatii	na at point	of use (no	o hot water	r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
		19.22		17.29		· ·				17.05	10.50	24.20		(46)
(46)m= Water	21.97 storage		19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(40)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
•		,		•) litres in							` '
	•	•			_		neous co	` '	ers) ente	er '0' in (47)			
	storage			•					·		•			
a) If m	nanufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	y lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
,	nanufact			-										
	ater stora	-			e 2 (kWl	h/litre/da	ay)				0.	02		(51)
I+ 0000	munity h	_		on 4.3									1	/== ·
	a factor		hla 0-								1 1	00		(50)
Volum	e factor			2h							-	03		(52)
Volum Tempe	erature fa	actor fro	m Table					(47) - (51)	(50)	50)	0	.6		(53)
Volum Tempe Energy		actor fro m water	m Table storage		ear			(47) x (51)) x (52) x (53) =	1.			

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	-	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if c May 117.03 L, equati	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Append	only if c May 117.03 L, equati 7.53 dix L, eq	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03 15.21 ble 5	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Apulated in 203.32 ted in Apulated	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	culation of Table 5 5), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 ted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7 0	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	culation of Table 5 5), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 ted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Courthweaters												
Southwest _{0.9x} 0.77	X	0.6	55	-	04.39		0.24	X	0.7	=	7.9	(79)
Southwest _{0.9x} 0.77	×	5.5	51	× S	2.85		0.24	X	0.7	=	59.56	(79)
Southwest _{0.9x} 0.77	×	0.6	35	x 5	2.85		0.24	x	0.7	=	7.03	(79)
Southwest _{0.9x} 0.77	x	5.5	51	x e	9.27		0.24	X	0.7	=	44.43	(79)
Southwest _{0.9x} 0.77	x	0.6	S5	× 6	9.27		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9x} 0.77	X	5.5	51	X 4	4.07		0.24	x	0.7	=	28.27	(79)
Southwest _{0.9x} 0.77	X	0.6	S5	X 4	4.07		0.24	x	0.7	=	3.34	(79)
Southwest _{0.9x} 0.77	X	5.5	51	x 3	31.49		0.24	x	0.7	=	20.2	(79)
Southwest _{0.9x} 0.77	X	0.6	35	x 3	1.49		0.24	x	0.7	=	2.38	(79)
Solar gains in watts, ca	lculated	for eacl	h month	_		(83)m = S	um(74)m .	(82)m			i	
(83)m= 45.33 83.51	130.97	190.29	238.71	248.23	234.64	196.79	151.24	96.8	55.44	38.05		(83)
Total gains – internal a	nd solar	(84)m =	= (73)m -	+ (83)m	, watts							
(84)m= 453.33 489.52	524.22	562.95	590.51	579.86	553.11	521.02	485.99	452.34	434.89	435.38		(84)
7. Mean internal temp	erature ((heating	season)								
Temperature during h	eating p	eriods ir	n the livii	ng area	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisation factor for ga	ains for li	iving are	ea, h1,m	(see Ta	ble 9a)		, ,					
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1 1	0.99	0.98	0.92	0.78	0.61	0.66	0.89	0.98	1	1		(86)
` '	atura in I	living or		llow oto	no 2 to 7	L Tobl			1			
Mean internal tempera (87)m= 19.84 19.95	20.16	20.46	20.74	20.93	20.99	20.98	20.85	20.5	20.12	19.82		(87)
` '				<u> </u>				20.0	20.12	10.02		(0.)
Temperature during h			i						I	l	1	(00)
(88)m= 20 20	20	20.02	20.02	20.03	20.03	20.03	20.03	20.02	20.01	20.01		(88)
Utilisation factor for ga	ains for r	est of d	welling,	h2,m (se	e Table	9a)						
(89)m= 1 1	0.99	0.97	0.89	0.69	0.48	0.54	0.83	0.97	0.99	1		(89)
Mean internal tempera	ature in t	the rest	of dwelli	na T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18.45 18.61	18.92	19.36	19.75	19.98	20.02	20.02	19.9	19.43	18.88	18.43		(90)
			<u> </u>	!	l		f	LA = Livir	ng area ÷ (4	4) =	0.26	(91)
Manager		. (1 1.		(I		. (4 . 0	A) TO					
Mean internal tempera								40.74	100	40.70		(92)
(92)m= 18.81 18.96	19.25	19.65	20.01	20.23	20.28	20.27	20.15	19.71	19.2	18.79		(92)
Apply adjustment to th	19.25	19.65	20.01	20.23	m Table 20.28	4e, whe	20.15	19.71	19.2	18.79		(93)
` '		19.00	20.01	20.23	20.20	20.27	20.15	19.71	19.2	16.79		(90)
8. Space heating requ		nn a ratiu	ro obtoin	and at at	on 11 of	Table O	a aa tha	tTim /	76\m an	d ro colo	vuloto	
Set Ti to the mean into the utilisation factor fo		•		ied at St	эр гтог	rable 9	o, so ma	t 11,111=(76)III an	u re-caic	uiale	
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for ga			· · ·	!					1			
(94)m= 1 0.99	0.99	0.96	0.89	0.71	0.52	0.57	0.84	0.97	0.99	1		(94)
Useful gains, hmGm ,	W = (94)	l)m x (84	4)m						•			
(95)m= 451.43 486.15	516.68	540.75	523.21	413.46	285.5	297.27	406.34	437.8	431.39	433.9		(95)
Monthly average exte	rnal tem	perature	from Ta	able 8	•				•	•	1	
(96)m= 4.3 4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mea	ın intern	al tempe	erature,	Lm , W :	- =[(39)m :	x [(93)m	– (96)m]	•		•	
(97)m= 1182.88 1143.39	1033.77	861.04	664.04	444.04	289.93	304.65	479.42	727.84	971.82	1177.62		(97)

Space heating	ıg require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4 ⁻	1)m			
(98)m= 544.2	441.67	384.71	230.61	104.78	0	0	0	0	215.79	389.11	553.33		
							Tota	l per year	(kWh/year) = Sum(9	98)15,912 =	2864.18	(98)
Space heating	g require	ement in	kWh/m²	²/year								38.67	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo	r June,	July and	August.	See Tal	ole 10b								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate						1	ì				-		(400)
(100)m= 0	0	0	0	0	741.37	583.63	597.87	0	0	0	0		(100)
Utilisation fac	tor for ic	oss nm	0	0	0.85	0.92	0.89	0	0	0	0		(101)
Useful loss, h		<u> </u>	<u> </u>		<u> </u>	0.52	0.00						()
(102)m = 0	0	0	0	0	628.97	534.61	533.86	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	ļ.				
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space cooling set (104)m to	•				dwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	(41)m	
(104)m= 0	0	0	0	0	88.58	137.36	110.8	0	0	0	0		
	•	•	•	•	•	•	•	Tota	l = Sum(104)	=	336.73	(104)
Cooled fractio			`					f C =	cooled	area ÷ (4	4) =	0.6	(105)
Intermittency f $(106)m = 0$	actor (1a	able 10b	0	0	0.25	0.25	0.25	0	0	0	0		
(100)111=	0	0	0		0.23	0.23	0.23	l	 = Sum(=	0	(106)
Space cooling	requirer	ment for	month =	: (104)m	× (105)	× (106)r	m	7014	ı — Gamı	16561)	L		(,
(107)m= 0	0	0	0	0	13.31	20.63	16.64	0	0	0	0		
								Tota	I = Sum(107)	=	50.58	(107)
Space cooling	requirer	ment in k	رWh/m²/	year				(107) ÷ (4) =			0.68	(108)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme)							
This part is us										unity scl	heme.		7(204)
Fraction of spa			•		•	•	(Table T	1) U II N	one		Ĺ	0	(301)
Fraction of spa	ace heat	from co	mmunity	system /	1 – (30	1) =					L	1	(302)
The community sincludes boilers, I									up to four	other heat	sources; th	e latter	
Fraction of he				asic rical r	ioni powe	stations.	осс Аррсі	idix O.			Г	0.13	(303a)
Fraction of co	mmunity	heat fro	m heat s	source 2							Ĺ	0.87	(303b)
Fraction of total	•								(3	02) x (303	ы Ва) = Г	0.13	(304a)
Fraction of total	•			•		e 2			(3	02) x (303	Bb) = [0.87	(304b)
Factor for con	•			•			unity hea	ntina svs		, ,	΄ L Γ	1	(305)
Distribution los				,	` ''		•		- #		L T	1.05	(306)
Space heatin		(14516	. 20, .0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ny moan	ng cyclo					L	kWh/yea	
Annual space	_	requiren	nent								Γ	2864.18	
Space heat fro	om Comi	munity C	HP					(98) x (3	04a) x (30	5) x (306)	=	390.96	(307a)
•		•									L		

Space heat from heat source 2		(98) x (304)	b) x (305) x (306) =	2616.43	(307b)
Efficiency of secondary/supplemen	tary heating system in % (0	(308
Space heating requirement from se	,) x 100 ÷ (308) =	0	(309)
	oondary/ouppromomary of	(55) 11 (55.1)	, (652)	Ŭ	
Water heating Annual water heating requirement				2063.55	7
If DHW from community scheme:		(0.1) (000	\ (0.05) (0.00)		
Water heat from Community CHP			a) x (305) x (306) =	281.67	(310a)
Water heat from heat source 2			b) x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution		0.01 × [(307a)((307e) + (310a)(310e)] =		(313)
Cooling System Energy Efficiency I				4.73	(314)
Space cooling (if there is a fixed co	-)) = (107) ÷ (3	314) =	10.71	(315)
Electricity for pumps and fans within mechanical ventilation - balanced, or	O \ ,	m outside		158.57	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (3	330b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Ap	ppendix L)			325.25	(332)
12b. CO2 Emissions – Community	heating scheme				_
Electrical efficiency of CHP unit				30.6	(361)
					_
Heat efficiency of CHP unit				63	(362)
Heat efficiency of CHP unit		Energy kWh/year	Emission facto kg CO2/kWh		(362)
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year		r Emissions	(362)
·		kWh/year	kg CO2/kWh	r Emissions kg CO2/year	_
Space heating from CHP)		kWh/year 620.57 189.9	kg CO2/kWh	r Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	620.57 189.9	kg CO2/kWh x 0.22 x 0.52	r Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	620.57 189.9 447.1 136.81	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	620.57 189.9 447.1 136.81	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us $[(307b)$	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 b)+(310b)] x 100 ÷ (367b)	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 uel 96.7 = 1005.5	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us [(307b) on	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 sel 96.7 = 1005.5 = 26.85	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) on nity systems g (secondary)	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x (363)(366) + (368) (309) x	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 sel 96.7 = 1005.5 = 26.85 = 1093.41	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) on nity systems g (secondary) mersion heater or instanta	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x (363)(366) + (368) (309) x	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 sel 96.7 = 1005.5 = 26.85 = 1093.41 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) on nity systems g (secondary) mersion heater or instantal and water heating	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x (363)(366) + (368) (309) x neous heater (312)	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 sel 96.7 = 1005.5 = 26.85 = 1093.41 = 0 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space a	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) on nity systems g (secondary) mersion heater or instantal and water heating	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x (363)(366) + (368) (309) x neous heater (312) (373) + (374) + (375) = (315) x	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 el	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space a CO2 associated with space cooling	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) on nity systems g (secondary) mersion heater or instanta and water heating pumps and fans within dwe	kWh/year 620.57 189.9 447.1 136.81 sing two fuels repeat (363 p)+(310b)] x 100 ÷ (367b) [(313) x (363)(366) + (368) (309) x neous heater (312) (373) + (374) + (375) = (315) x	kg CO2/kWh x	r Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 el	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

18.23 (384) 84.81 (385)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 3-2	2-Clean				
Address: 1. Overall dwelling dime	pneione:								
1. Overall dwelling diffie	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.06	(4)			_		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+ [0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	_ = [0	x	20 =	0	(6b)
Number of intermittent fa	ins				0	x -	10 =	0	(7a)
Number of passive vents	;			Ī	0	x -	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	x	40 =	0	(7c)
				_					
		_	<i>(</i> _)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		.a to (/ ,			0 (0) 10	(1.0)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o irie grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	⁹ x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	(8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed		Г	
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (′	19)] =			0.78	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18					0.12	(21)
Infiltration rate modified f	•							02	` ′
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
		_		_	_	_		-	

Adjusted infiltrat	ion rate (a	allowir	ng for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effecti		-	ate for t	he appli	cable ca	se	•	•	•	•	•	, 	
If mechanical			ndiv N (2	3h) - (23a	a) × Fmv (4	aguation (NS)) othe	rwica (23k	a) = (23a)			0.5	(23a)
If balanced with h) = (23a)			0.5	(23b)
a) If balanced		-	•	_					2h\m + 1	(23h) v [1 _ (23c)	76.5 - 1001	(23c)
(24a)m= 0.27		0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(24a)
b) If balanced	mechanio	cal ve	ntilation	without	heat red	coverv (л МV) (24)m = (2	1 2b)m + (1 (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole hou if (22b)m				-	-				.5 × (23l	p)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural ve if (22b)m :									0.5]			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24d)
Effective air ch	hange rate	e - en	ter (24a	or (24k	o) or (24	c) or (24	ld) in bo	x (25)				-	
(25)m= 0.27	0.26).26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(25)
3. Heat losses	and heat	loss p	aramete	er:									
ELEMENT	Gross area (m		Openin m	gs	Net Ar A ,r		U-va W/m		A X U (W/		k-value kJ/m²-		A X k kJ/K
Doors					2.6	х	1.2	=	3.12				(26)
Windows Type 1	I				3.26	x1	/[1/(1.2)-	+ 0.04] =	3.73				(27)
Windows Type 2	2				3.95	x1	/[1/(1.2)-	+ 0.04] =	4.52				(27)
Windows Type 3	3				5.51	x1	/[1/(1.2)-	+ 0.04] =	6.31				(27)
Windows Type 4	1				0.65	x1	/[1/(1.2)-	+ 0.04] =	0.74				(27)
Walls Type1	38.14		20.58	3	17.56	S X	0.15	=	2.63				(29)
Walls Type2	23.92		2.6		21.32	<u>x</u>	0.15		3.2				(29)
Walls Type3 [5.95		0		5.95	x	0.15	=	0.89				(29)
Walls Type4	29.51		0		29.51	X	0.15	=	4.43				(29)
Roof [20.45		0		20.45	x	0.15	=	3.07				(30)
Total area of ele	ments, m	2			117.9	7							(31)
Party wall					12.35	5 x	0	=	0				(32)
Party floor					76.06	6							(32a)
Party ceiling					55.61					[(32b)
* for windows and ro ** include the areas						ated usin	g formula	1/[(1/U-val	ue)+0.04] :	as given in	paragrapi	h 3.2	_
Fabric heat loss,	, W/K = S	(A x l	J)				(26)(30) + (32) =				40.9	(33)
Heat capacity Co	m = S(A x)	(k)						((28).	(30) + (3	2) + (32a).	(32e) =	26201.4	15 (34)
Thermal mass p	arameter	(TMP	= Cm ÷	· TFA) ir	n kJ/m²K			Indica	ative Value	e: Medium		250	(35)
For design assessm	ents where	the det	ails of the	construct	ion are no	t known p	recisely th	e indicativ	e values o	f TMP in T	able 1f		

can be used inste	ead of a de	tailed calci	ulation.										
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix I	K						23.27	(36)
if details of therm	,	,			•								` ′
Total fabric he	eat loss							(33) +	(36) =			64.17	(37)
Ventilation he	at loss ca	alculated	monthly	У				(38)m	= 0.33 × (25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	80.13	(39)
(40)m= 1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
Number of da	ys in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.05	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
	•		•	•	•	•	•		•	•	•	•	
4. Water hea	iting ene	rgy requi	irement:								kWh/y	ear:	
												1	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.38		(42)
Annual average	•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).82	1	(43)
Reduce the annu	_				_	_	to achieve	a water us	se target o	f		J	
not more that 125				aler use, r	ioi and co	•	1		<u> </u>		1	1	
Jan Hot water usage	Feb	Mar	Apr	May	Jun	Jul Toble 10 Y	Aug	Sep	Oct	Nov	Dec		
	· ·		i	· 			· <i>′</i>					1	
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	4000.0	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
				_					Total = Su	m(45) ₁₁₂ =	-	1428.9	(45)
If instantaneous v	vater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	•			•	
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storage Storage volun		includin	na anv sa	olar or M	/WHRS	storana	within sa	ame ves	امء		0	1	(47)
If community I	, ,		•			_		arric ves	301		U]	(47)
Otherwise if n	_			-			. ,	ers) ente	er '0' in (47)			
Water storage			(1)					, ,	(,			
a) If manufac	turer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Temperature	factor fro	m Table	2b								0]	(49)
Energy lost fro		_	-				(48) x (49)) =		1	10		(50)
b) If manufac			-									- 1	<i>,</i> .
Hot water stor If community I	_			e∠(KVV	ri/litre/da	ay)				0.	.02]	(51)
Volume factor	_		UII 7.U							1	.03	1	(52)
Temperature			2b								0.6	1	(53)

Energy lost from water storage, kWh/year	(47) x (51) x (52	2) x (53) =	1.03	(54)
Enter (50) or (54) in (55)			1.03	(55)
Water storage loss calculated for each month	((56)m = (55) ×	(41)m		
	32.01 32.01 30.9		0.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H1	11)] ÷ (50), else (57)m =	(56)m where (H11) is from Append	x H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98	32.01 32.01 30.9	98 32.01 3	0.98 32.01	(57)
Primary circuit loss (annual) from Table 3			0	(58)
Primary circuit loss calculated for each month (59) m = (58)	, , ,			
(modified by factor from Table H5 if there is solar water			<u> </u>	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51	23.26 23.26 22.5	51 23.26 2	2.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365	5 × (41)m			
(61)m= 0 0 0 0 0 0	0 0 0	0	0 0	(61)
Total heat required for water heating calculated for each	month (62) m = 0.85	5 × (45)m + (46	s)m + (57)m +	(59)m + (61)m
(62)m= 203.42 179.5 188.98 170.06 167.13 150.01	144.71 157.91 157.	.35 176.31 18	85.61 198.75	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative	e quantity) (enter '0' if no	solar contribution t	to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, s	see Appendix G)			
(63)m= 0 0 0 0 0 0	0 0 0	0	0 0	(63)
Output from water heater				
(64)m= 203.42 179.5 188.98 170.06 167.13 150.01	144.71 157.91 157.	.35 176.31 18	85.61 198.75	
	Output from	m water heater (ar	nnual) ₁₁₂	2079.74 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 ×	(45)m + (61)m] + 0).8 x [(46)m + (57)m + (59)m	1
ο · · · · · · · · · · · · · · · · · · ·	\	[() (()	1
	73.96 78.35 77.3		6.72 91.93	(65)
	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in cylinder is included (57)m i	73.96 78.35 77.3	33 84.47 8	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is i	73.96 78.35 77.3 in the dwelling or ho	33 84.47 8 ot water is from	6.72 91.93	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (65)m only if cylinder is included (57)m in cylinder is inclu	73.96 78.35 77.3 in the dwelling or ho	33 84.47 8 ot water is from	91.93 on community h	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (57)m i	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119	33 84.47 8 ot water is from ep Oct .19 119.19 11	6.72 91.93 n community h	(65) eating
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m in calculation of (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder is included (57)m in cylinder i	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119	33 84.47 8 ot water is from ep Oct .19 119.19 11	6.72 91.93 n community h	(65) eating
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m only if cylinder is included (57)m only if cylinder is included in Special States (55)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (65)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only if cylinder is included (66)m only	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119. L9a), also see Table 7.01 9.12 12.3	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1	91.93 n community h	(65) eating (66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included in calculated in the cylinder is included in the cylinder in the cylinder is included in the cylinder is included in the cylinder is included in the cylinder is included in the cylinder in the cylinder is included in the cylinder in the cylinder is included in the cylinder in the cylinder is included in the cylinder in the cylinder in the cylinder in the cylinder in the cylind	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119. L9a), also see Table 7.01 9.12 12.3	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5	91.93 n community h	(65) eating (66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included. 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161	33 84.47 8 ot water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18	Nov Dec 19.19 119.19 19.33	(65) eating (66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculated in Sand 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19	73.96 78.35 77.3 in the dwelling or hold 19.19 119.19 119.19 12.3 3 or L13a), also see Table 157.86 155.67 161. Ir L15a), also see Table 157.86 155.67 161.	able 5	Nov Dec 19.19 119.19 8.14 19.33 187.76 201.7	(65) eating (66) (67) (68)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is included (57)m only if cylinder is included (57)m. 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 <td>73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161</td> <td>able 5</td> <td>Nov Dec 19.19 119.19 19.33</td> <td>(65) eating (66) (67)</td>	73.96 78.35 77.3 in the dwelling or ho Jul Aug Se 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161	able 5	Nov Dec 19.19 119.19 19.33	(65) eating (66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 1	73.96 78.35 77.3 in the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling fro	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 14.92 34.92 34.92	(65) eating (66) (67) (68) (69)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculated in Sand 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19	73.96 78.35 77.3 in the dwelling or hold 19.19 119.19 119.19 12.3 3 or L13a), also see Table 157.86 155.67 161. Ir L15a), also see Table 157.86 155.67 161.	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 8.14 19.33 187.76 201.7	(65) eating (66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Solution	73.96 78.35 77.3 in the dwelling or ho Jul Aug So 119.19 119.19 119 L9a), also see Table 7.01 9.12 12.3 3 or L13a), also see 157.86 155.67 161 or L15a), also see Table 34.92 34.92 34.9	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 1201.7 14.92 34.92 0 0	(65) eating (66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5), Watts Solution	73.96 78.35 77.3 in the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling fro	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3	Nov Dec 19.19 119.19 119.19 14.92 34.92 34.92	(65) eating (66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Solution	73.96	able 5 92 34.92 3 0 0 0 0.35 -95.35 -9	Nov Dec 19.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70) (71)
include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5), Watts Jan	73.96	33 84.47 8 of water is from ep Oct .19 119.19 11 e 5 .24 15.54 1 e Table 5 .19 172.93 18 able 5 92 34.92 3 0 0 .35 -95.35 -9 7.4 113.53 12	Nov Dec 19.19 119.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5, Watts Jan	73.96	able 5 92 34.92 3 0 0 0 35 -95.35 -9 7.4 113.53 12 m + (70)m + (71)m	91.93 n community h Nov Dec 19.19 119.19 8.14 19.33 87.76 201.7 4.92 34.92 0 0 95.35 -95.35 20.45 123.56 1 + (72)m	(65) eating (66) (67) (68) (69) (70) (71) (72)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculation of (65)m only if cylinder is include (57)m in calculate 5), Watts Jan	73.96	able 5 92 34.92 3 0 0 0 35 -95.35 -9 7.4 113.53 12 m + (70)m + (71)m	Nov Dec 19.19 119.19 119.19 119.19 14.92 34.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(65) eating (66) (67) (68) (69) (70) (71)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Southwesto.	<u> </u>	X	0.6	35	x	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwesto.	9x 0.77	x	5.5	51	x	9	2.85]		0.24	X	0.7	=	59.56	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	6	9.27]		0.24	X	0.7	=	44.43	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	6	9.27]		0.24	X	0.7	=	5.24	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	4	4.07] [0.24	X	0.7	=	28.27	(79)
Southwesto.	9x 0.77	x	0.6	S5	x	4	4.07]		0.24	X	0.7	=	3.34	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	3	1.49]		0.24	x	0.7	=	20.2	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	3	1.49			0.24	x	0.7	=	2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 45.3	33 83.51	130.97	190.29	238.71	24	18.23	234.64	196.	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts					_		,	
(84)m= 459.	55 495.72	530.19	568.54	595.68	58	34.66	557.68	525.	.64	490.82	457.56	440.55	441.4		(84)
7. Mean ir	ternal tem	perature	(heating	season)										
Temperati	ure during l	neating p	eriods ir	n the livii	ng a	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisation	factor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)								
Ja	n Feb	Mar	Apr	May	,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.98	0.92	С).78	0.6	0.6	6	0.89	0.98	1	1		(86)
Mean inte	rnal tempe	rature in	living ar	ea T1 (fo	יסווכי	w ste	ns 3 to 7	in T	able	e 9c)		•		•	
(87)m= 19.8		20.18	20.48	20.75	_	0.94	20.99	20.9	$\overline{}$	20.86	20.52	20.15	19.85]	(87)
Tomporati	ure during l	noating p	oriode ir	roct of	طس	allina	from To	hla C		2 (°C)			1	ı	
(88)m= 20.0		20.03	20.04	20.04	_	0.05	20.05	20.0	_	20.05	20.04	20.04	20.03]	(88)
. ,				<u> </u>				<u> </u>				1	1	l	, ,
	factor for g	1	0.97	welling, 0.89	_	m (se	0.48	<u> </u>	., 1	0.83	0.97	1 0.00	<u> </u>	1	(89)
(33)		0.99						0.5				0.99	1		(69)
	rnal tempe				$\overline{}$								1	1	
(90)m= 18.5	18.67	18.98	19.41	19.79		20	20.05	20.0	04	19.93	19.47	18.93	18.49		(90)
										T	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inte	rnal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2				-	
(92)m= 18.8	36 19.01	19.28	19.68	20.03	2	0.24	20.29	20.2	28	20.16	19.74	19.24	18.84		(92)
,	stment to t				_				_					1	
(93)m= 18.8		19.28	19.68	20.03	2	0.24	20.29	20.2	28	20.16	19.74	19.24	18.84		(93)
•	neating req														
	ne mean in ion factor f				ed	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=	⊧(76)m an	d re-cald	culate	
Ja		Mar	Apr	May	П	Jun	Jul	Δι	ug	Sep	Oct	Nov	Dec]	
	factor for g		•	ividy	<u>'</u>	ouri	<u> </u>		ug į	ОСР	000	1107	<u> </u>	J	
(94)m= 1		0.99	0.96	0.89	C).71	0.52	0.5	57	0.84	0.97	0.99	1]	(94)
	ns, hmGm	, W = (94	1)m x (8	4)m				l	!			Į	<u>!</u>	I	
(95)m= 457.		522.88	546.7	528.43	41	16.75	287.26	299	9.3	410.53	443.22	437.18	439.99]	(95)
Monthly a	verage exte	ernal tem	perature	from Ta	able	e 8						-1	•		
(96)m= 4.3	3 4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(93	3)m-	– (96)m]			-	
(97)m= 1186	5.76 1147.19	1037.22	864.33	666.56	44	16.01	291.35	306.	.17	481.57	730.92	975.76	1182.11		(97)

Spac	e heating	a require	ement fo	r each m	nonth. k\	Wh/mon	th = 0.02	24 x [(97)m – (95	5)ml x (4 ⁻	1)m			
(98)m=	542.39	439.96	382.66	228.69	102.77	0	0	0	0	214.05	387.78	552.14		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2850.45	(98)
Spac	e heating	g require	ement in	kWh/m²	/year							Ī	37.48	(99)
8c. S	pace cod	oling rec	uiremer	nt								-		
Calcu	lated for	June, c	July and	August.	See Tal	ole 10b	,							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat (100)m=	loss rate	Lm (ca	lculated 0	using 28	o°C inter	nal temp 743.01	584.92	and exte	ernal ter	nperatur 0	e from T	able 10)		(100)
` '	ation fac		ļ	U	U	743.01	364.92	399.29		0	U	U		(100)
(101)m=		0	0	0	0	0.85	0.92	0.9	0	0	0	0		(101)
	ıl loss, h	mLm (V	ı /atts) = ((100)m x	(101)m		<u> </u>			ļ				
(102)m=		0	0	0	0	634.58	538.46	538.26	0	0	0	0		(102)
Gains	s (solar g	gains ca	lculated	for appli	cable we	eather re	gion, se	e Table	10)	•				
(103)m=		0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
	e cooling 04)m to					lwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	c (41)m	
(104)m=		0	0	0	0	89.76	139.66	112.76	0	0	0	0		
			Į			ļ.	!	!	Tota	l = Sum(104)	=	342.18	(104)
	d fraction								f C =	cooled	area ÷ (4	4) =	0.59	(105)
	ittency fa		1	<u> </u>		0.05	0.05	0.05			0			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0 = Sum(0	0		7(106)
Space	cooling	requirer	ment for	month =	(104)m	× (105)	× (106)r	m	TOla	ı = Surrı(1 .U.41)	= [0	(106)
(107)m=		0	0	0	0	13.13	20.43	16.49	0	0	0	0		
									Tota	l = Sum(107)	=	50.05	(107)
Space	cooling	requirer	ment in k	(Wh/m²/y	/ear				(107) ÷ (4) =			0.66	(108)
9b. En	ergy req	uiremer	nts – Cor	mmunity	heating	scheme								
	art is use on of spa			• .		•		.	•		unity sch	neme.	0	(301)
	•			-		-	_	(Table T	1) 0 11 11	One		Ĺ		=
	on of spa			•	•	`	•		0.10			Ĺ	1	(302)
	nmunity sc s boilers, h									up to four (other heat	sources; th	ne latter	
	on of hea		_			•							0.13	(303a)
Fraction	on of con	nmunity	heat fro	m heat s	ource 2								0.87	(303b)
Fraction	on of tota	ıl space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fraction	on of tota	ıl space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r commi	unity hea	ating sys	tem			1	(305)
	ution los				•	. ,,		•	0 ,				1.05	(306)
	heating		,	, •		,	5 - 7 - 10					L	kWh/year	
-	l space l		requiren	nent								[2850.45	7
Space	heat fro	m Comr	munity C	HP					(98) x (3	04a) x (305	5) x (306) :	<u> </u>	389.09	(307a)
												L		_

Space heat from heat source 2		(98) v (304h)) x (305) x (306) =	2603.88	(307b)
Efficiency of secondary/supplementary h	posting system in % (from			0	(308
Space heating requirement from second		• •	x 100 ÷ (308) =	0	(309)
	ary/supplementary system	(90) X (301) 7	x 100 ÷ (300) =		(309)
Water heating Annual water heating requirement				2079.74	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a)) x (305) x (306) =	283.88	(310a)
Water heat from heat source 2) x (305) x (306) =	1899.84	(310b)
Electricity used for heat distribution		0.01 × [(307a)(3	.07e) + (310a)(310e)] =	= 51.77	
Cooling System Energy Efficiency Ratio				4.73	(314)
Space cooling (if there is a fixed cooling	system, if not enter 0)	= (107) ÷ (31	4) =	10.59	(315)
Electricity for pumps and fans within dwe mechanical ventilation - balanced, extract	· ,	ıtside		162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year		=(330a) + (33	30b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Append	lix L)			332.22	(332)
12b. CO2 Emissions – Community heating	·				
Electrical efficiency of CHP unit	J			30.6	(361)
					_
Heat efficiency of CHP unit				63	(362)
Heat efficiency of CHP unit		Energy kWh/year	Emission facto kg CO2/kWh		(362)
·	a) × 100 ÷ (362) =		kg CO2/kWh	r Emissions	(362)
·		kWh/year	kg CO2/kWh	r Emissions kg CO2/year	_
Space heating from CHP) (307a less credit emissions for electricity –(307a		kWh/year	0.22 0.52	r Emissions kg CO2/year	(363)
Space heating from CHP) (307a) less credit emissions for electricity -(307a) Water heated by CHP (310a)	7a) × (361) ÷ (362) =	kWh/year 617.6 × 188.98 ×	0.22 0.52 0.22	r Emissions kg CO2/year	(363)
Space heating from CHP) (307a) less credit emissions for electricity -(307a) Water heated by CHP (310a)	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = 2a) × (361) ÷ (362) =	617.6 × 188.98 × 450.61 × 137.89 ×	0.22 0.52 0.22	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56	(363) (364) (365)
Space heating from CHP) (307a) less credit emissions for electricity (310a) Water heated by CHP (310a) less credit emissions for electricity (310a)	$(7a) \times (361) \div (362) =$ $(3a) \times 100 \div (362) =$ $(3a) \times (361) \div (362) =$ If there is CHP using two	617.6 × 188.98 × 450.61 × 137.89 ×	0.22 0.52 0.52 0.52 to (366) for the second for	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56	(363) (364) (365) (366)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%)	$(7a) \times (361) \div (362) =$ $(3a) \times (361) \div (362) =$ $(3a) \times (361) \div (362) =$ If there is CHP using tw	kWh/year 617.6	0.22 0.52 0.52 0.52 to (366) for the second for	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56	(363) (364) (365) (366) (367b)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2	$(7a) \times (361) \div (362) =$ $(3a) \times (361) \div (362) =$ $(3a) \times (361) \div (362) =$ If there is CHP using tw $(307b) + (31)$	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31)] [(37b)+(31)] [(37b)+(31)] [(37b)+(31)] [(37b)+(31)] [(37b)+(31)] [(37b)+(31)]	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) (307a) less credit emissions for electricity –(307a) Water heated by CHP (310a) less credit emissions for electricity –(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community sy	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31) [(3	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87 = 1093.96	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31) [(3	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87 = 1093.96 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31) [(3	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87 = 1093.96 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31) [(37) /stems (36) ondary) (30) ion heater or instantaneous ater heating (37)	kWh/year 617.6 188.98 450.61 137.89 x of fuels repeat (363) 0b)] x 100 ÷ (367b) x 13) x (3)(366) + (368)(369) x us heater (312) x (3) + (374) + (375) = 5) x	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87 = 1093.96 = 0 1093.96	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)
Space heating from CHP) (307a) less credit emissions for electricity —(307a) Water heated by CHP (310a) less credit emissions for electricity —(310a) Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec CO2 associated with water from immersion total CO2 associated with space and was CO2 associated with space cooling	7a) × (361) ÷ (362) = a) × 100 ÷ (362) = Da) × (361) ÷ (362) = If there is CHP using tw [(307b)+(31) [(37b) + (31) [(37b	kWh/year 617.6 188.98 450.61 137.89 x of fuels repeat (363) 0b)] x 100 ÷ (367b) x 13) x (3)(366) + (368)(369) x us heater (312) x (3) + (374) + (375) = 5) x	kg CO2/kWh 0.22 0.52 0.52 to (366) for the second for the seco	r Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 uel 96.7 = 1006 = 26.87 = 1093.96 = 0 1093.96 = 5.5	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376) (377)

Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

17.83 (384) 84.99 (385)

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	roperty	Address	: Flat 4-	1-Clean				
Address: 1. Overall dwelling dime	pneione:								
1. Overall awelling aime	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	141.28	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	54.34	(4)			_		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	141.28	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		7 + [0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = Ī	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x ′	10 =	0	(7a)
Number of passive vents	;			Ē	0	x ²	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_					
		_	<i>(</i> _)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(peen carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		(/ , ,			o (o) to	(1.0)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o ine grea	iter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	P x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	egree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18		<i>,</i> -			0.03	(21)
Infiltration rate modified f	•							0.10	(= -)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m = 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
			-	-		-		ı	

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2h) _ (22c	a) v Emy (aguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=		-	(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

Ventila	ation hea	nt loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		
Heat Id	oss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	81.67	(39)
(40)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		
Numbe	er of day	s in moi	nth (Tab	le 1a)				•	,	Average =	Sum(40) ₁ .	12 /12=	1.5	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
	ater heat			irement:							1.	kWh/ye	ear:	(42
if TF	A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.				•
Reduce	I averag the annua e that 125	ıl average	hot water	usage by	5% if the α	lwelling is	designed i	` ,		se target o		7.38		(43
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)			•			
(44)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
Energy (content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		928.53	(44
(45)m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
lf instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1217.45	(45
(46)m=	18.93	16.56	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		(46
	storage													
·	e volum	` ,					•		ame ves	sel		0		(47
Otherv	munity h vise if no storage	stored			_			. ,	ers) ente	er '0' in (47)			
a) If m	nanufact	urer's de	eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48
Tempe	erature fa	actor fro	m Table	2b								0		(49
	y lost fro nanufact		_	-		or is not		(48) x (49)) =		1	10		(50
	ater stora munity h	_			e 2 (kW	h/litre/da	ıy)				0.	02		(5
	e factor	•									1.	.03		(52
Tempe	erature fa	actor fro	m Table	2b								.6		(53
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54
Enter	(50) or (54) in (5	55)								1.	.03		(55
Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				

If cylinder cont	ains dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) - (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.0	1 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circ	uit loss (ar	nnual) fro	m Table	3							0		(58)
Primary circ	•	,			59)m = ((58) ÷ 36	65 × (41)	m				'	
(modified	by factor f	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.2	6 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss	calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat re	equired for	water h	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 181.	5 160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		(62)
Solar DHW inp	ut calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additio	nal lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	iter											
(64)m= 181.	5 160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		
	•						Outp	out from wa	ater heate	r (annual) ₁	12	1868.29	(64)
Heat gains	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	
(65)m= 86.1	9 76.65	82.1	75.82	75.91	70.14	69.56	73.3	72.22	78.51	80.22	84.87		(65)
include (5	7)m in cal	culation of	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal	gains (see	e Table 5	and 5a):									
Metabolic g													
	aii is t i abie	e 5). Wat	ts										
Ja		5), Wat Mar	ts Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	n Feb			May 90.9	Jun 90.9	Jul 90.9	Aug 90.9	Sep 90.9	Oct 90.9	Nov 90.9	Dec 90.9		(66)
Jai	Feb 90.9	Mar 90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		-			(66)
(66)m= 90.9	n Feb 90.9 ns (calcula	Mar 90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		-			(66) (67)
Jai (66)m= 90.9 Lighting gai	n Feb 90.9 ns (calcula 3 12.55	Mar 90.9 ted in Ap 10.21	Apr 90.9 opendix 7.73	90.9 L, equat 5.78	90.9 ion L9 o 4.88	90.9 r L9a), a 5.27	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		
(66)m= 90.9 Lighting gai (67)m= 14.1	n Feb 90.9 ns (calcula 3 12.55 gains (calc	Mar 90.9 ted in Ap 10.21	Apr 90.9 opendix 7.73	90.9 L, equat 5.78	90.9 ion L9 o 4.88	90.9 r L9a), a 5.27	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13	Mar 90.9 ted in Ap 10.21 culated in	Apr 90.9 ppendix 7.73 Append 147.16	90.9 L, equat 5.78 dix L, eq 136.02	90.9 ion L9 or 4.88 uation L	90.9 r L9a), a 5.27 13 or L1 118.56	90.9 Iso see 6.85 3a), also	90.9 Table 5 9.19 see Ta	90.9 11.67 ble 5 129.89	90.9	90.9		(67)
Jai (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 160.13 ns (calcula	Mar 90.9 ted in Ap 10.21 culated in	Apr 90.9 ppendix 7.73 Append 147.16	90.9 L, equat 5.78 dix L, eq 136.02	90.9 ion L9 or 4.88 uation L	90.9 r L9a), a 5.27 13 or L1 118.56	90.9 Iso see 6.85 3a), also	90.9 Table 5 9.19 see Ta	90.9 11.67 ble 5 129.89	90.9	90.9		(67)
Jan 90.9	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A	Apr 90.9 opendix 7.73 Append 147.16 opendix 32.09	90.9 L, equat 5.78 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.88 uation L 125.56 ion L15	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a)	90.9 lso see 6.85 3a), also 116.92	90.9 Table 5 9.19 See Ta 121.06 ee Table	90.9 11.67 ble 5 129.89 5	90.9	90.9		(67) (68)
Jal (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A	Apr 90.9 opendix 7.73 Append 147.16 opendix 32.09	90.9 L, equat 5.78 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.88 uation L 125.56 ion L15	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a)	90.9 lso see 6.85 3a), also 116.92	90.9 Table 5 9.19 See Ta 121.06 ee Table	90.9 11.67 ble 5 129.89 5	90.9	90.9		(67) (68)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92), also se 32.09	90.9 Table 5 9.19 see Ta 121.06 ee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69)
Jan (66)m= 90.9	n Feb 90.9 ns (calcula 12.55 gains (calcula 160.13 ns (calcula 9 32.09 fans gains 0 evaporation	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92), also se 32.09	90.9 Table 5 9.19 see Ta 121.06 ee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92 1, also se 32.09	90.9 Table 5 9.19 See Ta 121.06 ee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69) (70)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5)	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92 1, also se 32.09	90.9 Table 5 9.19 See Ta 121.06 See Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09 0	90.9 14.52 151.49 32.09 0		(67) (68) (69) (70)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.6	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72 ng gains (73 35 114.06	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 a (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5) -72.72	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72	90.9 13.62 141.02 32.09 0 -72.72	90.9 14.52 151.49 32.09 0 -72.72		(67) (68) (69) (70)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7 35 114.06 nal gains =	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 ole 5) -72.72 97.41 (66)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m	90.9 lso see - 6.85 3a), also 116.92), also se 32.09 0 -72.72 98.52 1+ (68)m+	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72 100.3 + (69)m + (6	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72)	90.9 14.52 151.49 32.09 0 -72.72 114.07		(67) (68) (69) (70) (71)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.4 Total interr (73)m= 338.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72 ng gains (73 114.06 nal gains =	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 a (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5) -72.72	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72	90.9 13.62 141.02 32.09 0 -72.72	90.9 14.52 151.49 32.09 0 -72.72		(67) (68) (69) (70)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (73 35 114.06 nal gains = 73 337.01 nins:	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table § 0 on (negated) 110.35 = 326.81	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72 102.03	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 le 5) -72.72 97.41 (66) 278.12	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m 267.6	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72 100.3 + (69)m + (280.83)	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7 297.35	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72) 316.34	90.9 14.52 151.49 32.09 0 -72.72 114.07		(67) (68) (69) (70) (71)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.4 Total interr (73)m= 338.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7 35 114.06 nal gains = 73 337.01 ins: re calculated	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5) 110.35 = 326.81 using sola	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72 102.03	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 le 5) -72.72 97.41 (66) 278.12	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m 267.6	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72 100.3 + (69)m + (280.83)	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7 297.35	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72) 316.34	90.9 14.52 151.49 32.09 0 -72.72 114.07	Gains	(67) (68) (69) (70) (71)

Northeast _{0.9x}	0.77	X	7.15	X	11.2	8	X	0.24	X	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.9	7	X	0.24	X	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	x	7.15	x	41.3	8	X	0.24	X	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	x	7.15	x	67.9	6	x	0.24	X	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	x	7.15	x	91.3	5	х	0.24	X	0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	x	7.15	x	97.3	8	x	0.24	x	0.7		162.13	(75)
Northeast 0.9x	0.77	x	7.15	x	91.	I	x	0.24	x	0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	x	7.15	x	72.6	3	x	0.24	X	0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	x	7.15	x	50.4	2	X	0.24	X	0.7	=	83.94	(75)
Northeast 0.9x	0.77	x	7.15	x	28.0	7	x	0.24	X	0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	x	7.15	x	14.2	2	x	0.24	X	0.7	=	23.64	(75)
Northeast _{0.9x}	0.77	x	7.15	x	9.2	I	X	0.24	X	0.7	=	15.34	(75)
Southwest _{0.9x}	0.77	x	2.19	x	36.7	9		0.24	X	0.7	=	9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.7	9		0.24	X	0.7	=	3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	x	62.6	7		0.24	X	0.7	=	15.98	(79)
Southwest _{0.9x}	0.77	x	0.75	x	62.6	7		0.24	x	0.7		5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	x	85.7	5		0.24	x	0.7		21.86	(79)
Southwest _{0.9x}	0.77	x	0.75	x	85.7	5		0.24	x	0.7	=	7.49	(79)
Southwest _{0.9x}	0.77	х	2.19	х	106.2	25		0.24	x	0.7	=	27.09	(79)
Southwest _{0.9x}	0.77	x	0.75	x	106.2	25		0.24	x	0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	x	2.19	x	119.0	01		0.24	х	0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	х	0.75	х	119.0	01		0.24	x	0.7	= =	10.39	(79)
Southwest _{0.9x}	0.77	х	2.19	х	118.	15		0.24	x	0.7	-	30.12	(79)
Southwest _{0.9x}	0.77	x	0.75	x	118.	15		0.24	х	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	х	2.19	x	113.9	91		0.24	x	0.7	=	29.04	(79)
Southwest _{0.9x}	0.77	x	0.75	x	113.9	91		0.24	x	0.7		9.95	(79)
Southwest _{0.9x}	0.77	x	2.19	x	104.3	39		0.24	x	0.7		26.62	(79)
Southwest _{0.9x}	0.77	x	0.75	x	104.3	39		0.24	x	0.7		9.12	(79)
Southwest _{0.9x}	0.77	x	2.19	x	92.8	5		0.24	x	0.7		23.67	(79)
Southwest _{0.9x}	0.77	x	0.75	x	92.8	5		0.24	x	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	x	2.19	x	69.2	7		0.24	x	0.7		17.66	(79)
Southwest _{0.9x}	0.77	x	0.75	x	69.2	7		0.24	x	0.7		6.05	(79)
Southwest _{0.9x}	0.77	x	2.19	x	44.0	7		0.24	x	0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	x	0.75	x	44.0	7		0.24	x	0.7		3.85	(79)
Southwest _{0.9x}	0.77	x	2.19	x	31.4	9		0.24	x	0.7		8.03	(79)
Southwest _{0.9x}	0.77	x	0.75	x	31.4	9		0.24	x	0.7	=	2.75	(79)
				-									_
Solar gains in v	vatts, calcul	ated	for each mon	th			(83)m	= Sum(74)m	(82)m	_		•	
(83)m= 31.38	59.69 98.		149.51 192.8			90.66	156	.65 115.73	70.44	38.72	26.12		(83)
Total gains – in			` 	`					i			1	
(84)m= 370.11	396.7 425	5.05	459.97 486.9	1 4	80.69 4	58.26	429	396.55	367.79	355.06	356.47		(84)
7. Mean intern	al temperat	ure (heating seaso	on)									
Temperature of	during heatii	ng pe	eriods in the li	ving	area fro	m Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fact	<u>`</u>	$\overline{}$		Ť					1			1	
Stroma ESA 2012	vErsbn: 1.0.4	196 (s	SAP 9.52 - http://	₩w.	stroma.co	႕ျ	Αι	ug Sep	Oct	Nov	Dec	Page	5 of 8

(86)m= 1 0.99 0.99 0.98 0.93 0.83 0.69 0.74 0.91 0.98 0.99 1	(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)	
(87)m= 19.36 19.49 19.75 20.12 20.51 20.81 20.94 20.91 20.68 20.21 19.73 19.34	(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)	
(88)m= 19.67 19.67 19.68 19.69 19.7 19.7 19.7 19.69 19.69 19.68 19.68	(88)
	(00)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	
(89)m= 1 0.99 0.99 0.97 0.9 0.74 0.52 0.58 0.85 0.97 0.99 1	(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	
(90)m= 17.53 17.71 18.09 18.64 19.18 19.56 19.67 19.66 19.42 18.77 18.07 17.5	(90)
$fLA = Living area \div (4) = 0.25$	(91)
Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2	_
(92)m= 17.99 18.16 18.51 19.01 19.51 19.87 19.99 19.98 19.73 19.13 18.48 17.96	(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate	(/
(93)m= 17.99 18.16 18.51 19.01 19.51 19.87 19.99 19.98 19.73 19.13 18.48 17.96	(93)
8. Space heating requirement	(00)
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate	
the utilisation factor for gains using Table 9a	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Utilisation factor for gains, hm:	
(94)m= 0.99 0.99 0.98 0.96 0.89 0.75 0.57 0.62 0.86 0.96 0.99 0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m	
(95)m= 367.38 392.51 417.04 440.27 435.54 362.05 259.6 267.23 339.64 354.44 350.71 354.22	(95)
Monthly average external temperature from Table 8	
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]	
(97)m= 1132.5 1094.9 989.8 826.4 637.1 426.11 273.9 288.39 456.98 695.8 931.89 1130.47	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m	
(98)m= 569.24 472 426.14 278.01 149.96 0 0 0 253.97 418.45 577.53	
Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 3145.31	(98)
	」 (99)
8c. Space cooling requirement	
Calculated for June, July and August. See Table 10b	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10)	(400)
(100)m= 0 0 0 0 0 759.65 598.02 613.05 0 0 0	(100)
Utilisation factor for loss hm	(404)
(101)m= 0 0 0 0 0 0.71 0.8 0.76 0 0 0 0	(101)
Useful loss, hmLm (Watts) = (100)m x (101)m	(400)
(102)m= 0 0 0 0 542.27 478.02 468.69 0 0 0 0	(102)
Gains (solar gains calculated for applicable weather region, see Table 10)	(400)
(103)m= 0 0 0 0 617.86 590.56 557.32 0 0 0 0	(103)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 × (98)m	
(104)m 0 0 0 0 0 83.73 65.94 0 0 0 0	
Total = Sum(104) = 149.67	(104)

Cooled fraction										(405)		
Cooled fraction Intermittency factor (Table	e 10b)						1 C =	cooled	area ÷ (0.7	(105)	
(106)m= 0 0	— i	0	0	0.25	0.25	0.25	0	0	0	0		
Space cooling requiremen	nt for mor	ath _ (1)	04\m	(10E)	(106)r	~	Tota	I = Sum	(104)	=	0	(106)
Space cooling requirement (107)m= 0 0		0	04)111	0	14.64	11.53	0	0	0	0	1	
<u> </u>	!	I	'				Tota	l = Sum	(1,0,7)	=	26.17	(107)
Space cooling requirement	nt in kWh	/m²/yea	ır				(107) ÷ (4) =			0.48	(108)
9b. Energy requirements												
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none											0	(301)
Fraction of space heat fro	m comm	unity sy	stem	1 – (30	1) =						1	(302)
The community scheme may ob includes boilers, heat pumps, go								up to four	other hea	t sources;	the latter	
Fraction of heat from Con	nmunity (CHP									0.13	(303a)
Fraction of community he	at from h	eat sou	rce 2								0.87	(303b)
Fraction of total space he	at from C	ommun	nity Ch	HP				(3	802) x (30	3a) =	0.13	(304a)
Fraction of total space he	at from c	ommuni	ity hea	at sourc	e 2			(3	802) x (30	3b) =	0.87	(304b)
Factor for control and charging method (Table 4c(3)) for community heating system										1	(305)	
Distribution loss factor (Table 12c) for community heating system										1.05	(306)	
	,		minain	ty Heath	ig syste	111					1.03	(000)
Space heating			imam	ty neath	ig syste	111					kWh/ye	
Annual space heating req			man	ty neath	ig syste	111					kWh/ye	ear
Annual space heating requestions Space heat from Communication	nity CHP		aiii	ty neath	ig syste		, , ,	04a) x (30	, , ,		kWh/ye	(307a)
Annual space heating required Space heat from Communication Space heat from heat source.	nity CHP urce 2						(98) x (3	04b) x (30	5) x (306)		kWh/ye	(307a)
Annual space heating requestions Space heat from Communication Space heat from heat source Efficiency of secondary/signals.	nity CHP urce 2 upplemer	ntary he	ating	system	in % (fro	om Table	(98) x (36)	04b) x (30 Appendix	5) x (306)		kWh/ye 3145.31 429.33	(307a) (307b) (308
Annual space heating required Space heat from Communication Space heat from heat source.	nity CHP urce 2 upplemer	ntary he	ating	system	in % (fro	om Table	(98) x (36)	04b) x (30	5) x (306)		kWh/ye 3145.31 429.33 2873.24	(307a)
Annual space heating requirements of Space heat from Communication Space heat from heat sour Efficiency of secondary/surpless Space heating requirements water heating	nity CHP urce 2 upplemer	ntary he	ating	system	in % (fro	om Table	(98) x (36)	04b) x (30 Appendix	5) x (306)		kWh/ye 3145.31 429.33 2873.24 0	(307a) (307b) (308
Annual space heating requirements of Space heat from Communication of Space heat from heat sour Efficiency of secondary/sursection of Space heating requirements water heating Annual water heating requirements.	nity CHP urce 2 upplemer nt from so	ntary he	ating	system	in % (fro	om Table	(98) x (36)	04b) x (30 Appendix	5) x (306)		kWh/ye 3145.31 429.33 2873.24	(307a) (307b) (308
Annual space heating requirements of Space heat from Communication Space heat from heat sour Efficiency of secondary/surpless Space heating requirements water heating	nity CHP urce 2 upplemer nt from so uirement scheme:	ntary he	ating	system	in % (fro	om Table	(98) x (36) 4a or A (98) x (36)	04b) x (30 Appendix	5) x (306) x E) ÷ (308) =	=	kWh/ye 3145.31 429.33 2873.24 0	(307a) (307b) (308
Annual space heating requirements of Space heat from Communication Space heat from heat sour Efficiency of secondary/sursection Space heating requirements water heating Annual water heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heating requirements of Space heat from Communication Space heat from Communication Space heat from Communication Space heat from Communication Space heat from heat sour Efficiency of Secondary/sursection Space heat from heat sour Efficiency of Secondary/sursection Space heating requirements of Space he	nity CHP urce 2 upplemer nt from so uirement scheme: nity CHP	ntary he	ating	system	in % (fro	om Table	(98) x (36) 4a or A (98) x (36) (64) x (36)	04b) x (30 appendix 01) x 100	5) x (306) (E) ÷ (308) =	=	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29	(307a) (307b) (308 (309)
Annual space heating requirements of Space heat from Community Space heat from heat sour Efficiency of secondary/sursections Space heating requirements water heating Annual water heating requirements of DHW from community sursections water heat from Community sursections.	nity CHP urce 2 upplemer ont from so uirement scheme: nity CHP urce 2	ntary he econdar	ating	system	in % (fro	om Table tem	(98) x (36) 4a or A (98) x (36) (64) x (36) (64) x (36)	04b) x (30 appendix 01) x 100 03a) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29	(307a) (307b) (308 (309) (310a)
Annual space heating requirements of Space heat from Community Space heat from heat sour Efficiency of secondary/sur Space heating requirements water heating Annual water heating requirements of DHW from community surface water heat from Community Surface heat from heat sour water heat from heat sour space heating requirements.	nity CHP urce 2 upplemer ont from so uirement scheme: nity CHP urce 2	ntary he econdar	ating	system	in % (fro	om Table tem	(98) x (36) 4a or A (98) x (36) (64) x (36) (64) x (36)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68	(307a) (307b) (308 (309) (310a) (310b)
Annual space heating requirements of Space heat from Community Space heat from heat sour Efficiency of secondary/sec	nity CHP urce 2 upplement of the control of the con	ntary he econdar n Ratio	ating ry/sup	system	in % (fro	om Table tem	(98) x (36) 4a or A (98) x (36) (64) x (36) (64) x (36)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64	(307a) (307b) (308 (309) (310a) (310b) (313)
Annual space heating requirements of Space heat from Communication Space heat from heat sour Efficiency of secondary/strong Space heating requirements water heating requirements of DHW from community source water heat from Communication Water heat from heat sour Electricity used for heat do Cooling System Energy Ene	nity CHP urce 2 upplement ont from so uirement scheme: nity CHP urce 2 listribution Efficiency a fixed co fans with	ntary he econdar Ratio poling sy	eating ry/sup ystem ling (T	system pplemen i, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (3) 4a or A (98) x (3) (64) x (3) (64) x (3) x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73	(307a) (307b) (308 (309) (310a) (310b) (313) (314)
Annual space heating requirements of space heat from Community Space heating requirements of space heating requirements. Space heating requirements water heating annual water heating requirements of the space heating requirements. Water heat from Community space water heat from heat sour Electricity used for heat do Cooling System Energy Electricity for pumps and	nity CHP urce 2 upplement ont from so uirement scheme: nity CHP urce 2 listribution Efficiency a fixed co fans with balanced,	ntary he econdar Ratio poling sy	eating ry/sup ystem ling (T	system pplemen i, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (3) 4a or A (98) x (3) (64) x (3) (64) x (3) x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315)
Annual space heating requirements of space heat from heat sour Efficiency of secondary/strong Space heating requirements. Space heating requirements water heating annual water heating requirements of the secondary se	nity CHP urce 2 upplement int from so uirement scheme: nity CHP urce 2 listribution efficiency a fixed co fans with balanced, fans	ntary he econdar Ratio poling sy	eating ry/sup ystem ling (T	system pplemen i, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (3) 4a or A (98) x (3) (64) x (3) (64) x (3) x [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a)
Annual space heating requirements of space heat from heat sour Efficiency of secondary/strong Space heating requirements. Space heating requirements water heating annual water heating requirements of the secondary se	nity CHP urce 2 upplement int from se uirement scheme: nity CHP urce 2 listribution efficiency a fixed co fans with balanced, fans ting	ntary he econdar Ratio poling sy in dwell extract	eating ry/sup ystem ling (T	system pplemen i, if not e	in % (fro tary syst	om Table tem 0.01	(98) x (3) 4a or A (98) x (3) (64) x (3) (64) x (3) x [(307a) = (107) =	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) 5) x (308) = 5) x (306) 5) x (306) 10 + (310a)	= = =	kWh/ye 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54 90.49 0	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a) (330b)

Energy for lighting (calculated in Appendix L)											
12b. CO2 Emissions – Community heating sch	neme										
Electrical efficiency of CHP unit					30.6	(361)					
Heat efficiency of CHP unit					63	(362)					
	Ener kWh/		Emission fac		nissions j CO2/year	_					
Space heating from CHP) (307a) × 100) ÷ (362) = 68 ²	.48 ×	0.22		147.2	(363)					
less credit emissions for electricity $-(307a) \times (307a)$	61) ÷ (362) =	.53 ×	0.52		-108.23	(364)					
Water heated by CHP (310a) × 100) ÷ (362) =	4.8 ×	0.22		87.44	(365)					
less credit emissions for electricity -(310a) × (3	61) ÷ (362) =	.87 ×	0.52		-64.29	(366)					
Efficiency of heat source 2 (%)	peat (363) to	(366) for the secon	d fuel	96.7	(367b)						
CO2 associated with heat source 2	[(307b)+(310b)] x 10	÷ (367b) x	=	1023.02	(368)						
Electrical energy for heat distribution	[(313) x		=	27.32	(372)						
Total CO2 associated with community systems	363)(366)	+ (368)(37	=	1112.46	(373)						
CO2 associated with space heating (secondar	y) (309) x		0	=	0	(374)					
CO2 associated with water from immersion he	ater or instantaneous heate	r (312) x	0.22	=	0	(375)					
Total CO2 associated with space and water he	eating (373) + (374	+ (375) =			1112.46	(376)					
CO2 associated with space cooling	(315) x		0.52	=	2.87	(377)					
CO2 associated with electricity for pumps and	fans within dwelling (331))	(0.52	=	46.97	(378)					
CO2 associated with electricity for lighting	(332))) x		0.52	=	129.5	(379)					
Total CO2, kg/year sum of	(376)(382) =				1291.8	(383)					
Dwelling CO2 Emission Rate (383)	- (4) =				23.77	(384)					
El rating (section 14)					82.57	(385)					

		l lser I	Details:										
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	STRO	016363							
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10					
	Property Address: Flat 4-2-Clean Address:												
Address: 1. Overall dwelling dime	ensions:												
T. Ovorali awolling alimo	niolono.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)				
Basement			55.61	(1a) x	2	2.6	(2a) =	144.59	(3a)				
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	55.61	(4)			-						
Dwelling volume		· ·		(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	144.59	(5)				
2. Ventilation rate:													
	main seconda heating heating	ry	other		total			m³ per hou	ır				
Number of chimneys	0 + 0	_ + [0] = [0	X 4	40 =	0	(6a)				
Number of open flues	0 + 0	7 + [0] = [0	x 2	20 =	0	(6b)				
Number of intermittent fa	ns				0	x '	10 =	0	(7a)				
Number of passive vents				Ī	0	x ′	10 =	0	(7b)				
Number of flueless gas fi	res			Ī	0	X 4	40 =	0	(7c)				
				_			A * I						
	(0.) (0.)	-	(-)	_			ı	nanges per ho	_				
•	ys, flues and fans = (6a)+(6b)+(neen carried out or is intended, proced			continue fr	0 rom (9) to		÷ (5) =	0	(8)				
Number of storeys in the		, a to (_/),	00		o (o) to	(1.6)		0	(9)				
Additional infiltration						[(9)	-1]x0.1 =	0	(10)				
	.25 for steel or timber frame o			•	ruction			0	(11)				
deducting areas of openir	resent, use the value corresponding t ngs); if equal user 0.35	o ine grea	ter wan are	a (aitei									
·	floor, enter 0.2 (unsealed) or 0).1 (seal	ed), else	enter 0				0	(12)				
If no draught lobby, en								0	(13)				
<u>-</u>	s and doors draught stripped		0.25 - [0.2	v (14) · 1	1001 -			0	(14)				
Window infiltration Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15)				
	q50, expressed in cubic metro	es ner h					area	3	(16)				
•	ity value, then $(18) = [(17) \div 20] +$	•	•	•	ou o or c	листоро	uica	0.15	(18)				
•	es if a pressurisation test has been do				is being u	sed			` ′				
Number of sides sheltere	ed		(0.0)					3	(19)				
Shelter factor			(20) = 1 -		19)] =			0.78	(20)				
Infiltration rate incorporat	•		(21) = (18) x (20) =				0.12	(21)				
Infiltration rate modified for	- 1 	Jul	Διια	Sep	Oct	Nov	Dec]					
L		Jui	Aug	Sep	I Oct	INOV	Dec						
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7						
, , , ,	1 1 3.0	1	1	<u> </u>	<u> </u>	<u> </u>	<u> </u>	I					
Wind Factor (22a)m = (22	' 	1	T		T	T	· . ·	1					
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18						

Adjusted infiltr	ation rate (allo	wing for st	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
	ctive air chang	e rate for t	he appli	cable ca	se	!		!!				
	al ventilation:	an and the NL (G) (00 ·	-) - - - (-		\(\f\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	' (00l-) (OO -)			0.5	(238
	eat pump using Ap							= (23a)			0.5	(23k
	h heat recovery: ef	-	_								76.5	(230
,	ed mechanical			1	<u> </u>	- 	<u> </u>			- ` ` `) ÷ 100] 1	(0.1
(24a)m= 0.27	0.26 0.26		0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J	(248
· ·	ed mechanical		1	1	<u> </u>	, 	<u> </u>	É Ì			1	(0.11
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24
•	nouse extract v n < 0.5 × (23b)		•	-				5 × (23b)		_	
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
,	ventilation or wn = 1, then (24							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate -	enter (24a	or (24l	o) or (240	c) or (24	d) in box	(25)			•		
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losse	s and heat los	s paramet	er:			•				•		
ELEMENT	Gross area (m²)	Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/h	<)	k-value kJ/m²-	-	A X k kJ/K
Doors				2.6	X	1.2	=	3.12				(26)
Windows Type	e 1			7.15	_x 1	/[1/(1.2)+	0.04] =	8.19				(27)
Windows Type	€ 2			2.19	x1	/[1/(1.2)+	0.04] =	2.51				(27)
Windows Type	∍ 3			0.75	x1	/[1/(1.2)+	0.04] =	0.86				(27)
Walls Type1	34.66	17.2	4	17.42	<u>x</u>	0.15	i	2.61	=		\neg	(29)
Walls Type2	23.92	2.6		21.32	x	0.15	<u> </u>	3.2	=		7 F	(29)
Walls Type3	2.63	0	=	2.63		0.15	=	0.39	=		= =	(29)
Walls Type4	25.13	0	=	25.13	=	0.15	<u> </u>	3.77	=		╡╞	(29)
Roof	55.61	0	=	55.61	=	0.15	-	8.34	룩 ¦		3	(30)
Total area of e				141.9	=	0.10		0.04				(31)
rotal area or c	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				_				— [
Party wall				7.81	X	0	=	0	[╡	(32)
•											1 1	(32
Party floor	l roof windows wo	a offactive wi	indou II v	55.61		y farmula 1	/F/1/II.vol	(0) (0 0 4 1 0	L			(
Party floor * for windows and	l roof windows, use as on both sides o			alue calcul		g formula 1	/[(1/U-valu	ıe)+0.04] a	L s given in	paragraph	 n 3.2	(32
Party floor * for windows and ** include the area		f internal wal		alue calcul	ated using	g formula 1.		ıe)+0.04] a	L s given in	paragraph	3.2	
Party floor * for windows and ** include the area Fabric heat los	as on both sides o	f internal wal x U)		alue calcul	ated using		+ (32) =	ue)+0.04] a				(33)
** include the area Fabric heat los Heat capacity	as on both sides of ss, W/K = S (A	f internal wali x U))	ls and par	alue calcula titions	ated using		+ (32) = ((28)		?) + (32a).		41.18	(33)
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both sides of ss, W/K = S (A $Cm = S(A \times k)$	f internal wall x U)) MP = Cm : details of the	ls and par - TFA) ir	alue calcula titions n kJ/m²K	ated using	(26)(30)	+ (32) = ((28)	(30) + (32 tive Value:	?) + (32a). Medium	(32e) =	41.18 17740.4	(33)
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	as on both sides of ss, W/K = S (A Cm = S(A x k) s parameter (TN sments where the	f internal wall x U)) MP = Cm ÷ details of the alculation.	: TFA) in	alue calculi titions n kJ/m²K tion are not	ated using	(26)(30)	+ (32) = ((28)	(30) + (32 tive Value:	?) + (32a). Medium	(32e) =	41.18 17740.4	(33)

Total fabric heat loss			(33) +	(36) =		İ	69.75	(37)
Ventilation heat loss calculated monthly			(38)m	09.73	(07)			
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 12.68 12.54 12.4 11.71 11.57 10.88	+	10.74	11.15	11.57	11.85	12.12		(38)
Heat transfer coefficient, W/K	_ l	1	(39)m	= (37) + (38)m	<u> </u>	l	
(39)m= 82.42 82.28 82.15 81.45 81.31 80.62	80.62	80.48	80.9	81.31	81.59	81.87		
Heat loss parameter (HLP), W/m²K	•			Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	81.42	(39)
(40)m= 1.48 1.48 1.48 1.46 1.46 1.45	1.45	1.45	1.45	1.46	1.47	1.47		
Number of days in month (Table 1a)			,	Average =	Sum(40) ₁	12 /12=	1.46	(40)
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31 30 31 30	31	31	30	31	30	31		(41)
4. Water heating energy requirement:						kWh/ye	ear:	
Assumed occupancy, N						86		(42)
if TFA > 13.9, $N = 1 + 1.76 \times [1 - exp(-0.000349 \times (1 + 1.76 \times 1.39)])$ if TFA £ 13.9, $N = 1$	ΓFA -13.9	9)2)] + 0.0	0013 x (TFA -13.	.9)		l	
Annual average hot water usage in litres per day Vd,a	verage =	(25 x N)	+ 36		78	3.26		(43)
Reduce the annual average hot water usage by 5% if the dwelling a not more that 125 litres per person per day (all water use, hot and determined the second	is designed			se target o				(1.5)
Jan Feb Mar Apr May Jun	·	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day for each month Vd,m = factor from			ОСР	000	1407	DCC		
(44)m= 86.09 82.96 79.83 76.7 73.57 70.44	70.44	73.57	76.7	79.83	82.96	86.09		
		1	-	Total = Su	m(44) ₁₁₂ =	=	939.13	(44)
Energy content of hot water used - calculated monthly = 4.190 x Vo	d,m x nm x l	DTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 127.67 111.66 115.22 100.45 96.39 83.17	77.07	88.44	89.5	104.3	113.85	123.64		_
If instantaneous water heating at point of use (no hot water storage	e) enter 0 in	hoxes (46		Total = Su	m(45) ₁₁₂ =	=	1231.35	(45)
(46)m= 19.15 16.75 17.28 15.07 14.46 12.48	·	13.27	13.42	15.65	17.08	18.55		(46)
Water storage loss:	11.50	13.27	13.42	13.03	17.00	10.55		(40)
Storage volume (litres) including any solar or WWHRS	S storage	within sa	ame ves	sel		0		(47)
If community heating and no tank in dwelling, enter 11	10 litres in	n (47)					•	
Otherwise if no stored hot water (this includes instanta	aneous co	ombi boil	ers) ente	er '0' in ((47)			
Water storage loss:	\/ 						1	(40)
a) If manufacturer's declared loss factor is known (kV	vii/day).					0		(48)
Temperature factor from Table 2b		(40) × (40)				0		(49)
Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is no	ot known:	(48) x (49)) =		1	10		(50)
Hot water storage loss factor from Table 2 (kWh/litre/o					0.	02		(51)
If community heating see section 4.3								
Volume factor from Table 2a Temperature factor from Table 2b						.03		(52)
		(47) (54)	\ v (EQ) (EQ)		.6		(53)
Energy lost from water storage, kWh/year Enter (50) or (54) in (55)		(47) x (51)) X (⊃∠) X (υ ა) =		03		(54) (55)
(, (, (, ()					<u>''</u>			(55)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	or	Area m²		Flu: Tak	x ole 6a		g_ Table 6b		FF Table 6c			Gains (W)		
Northeast 0.9x	0.77	x	7.15	x	1	1.28	x	0.24	×	0.7		<u> </u>	18.78	(75)	
Northeast 0.9x	0.77	x	7.15	x	2	2.97	x	0.24	x	0.7	<u> </u>	· Ē	38.24	(75)	
Northeast 0.9x	0.77	x	7.15	X	4	1.38	x	0.24	×	0.7		• [68.89	(75)	
Northeast 0.9x	0.77	x	7.15	X	6	7.96	x	0.24	×	0.7		• [113.14	(75)	
Northeast 0.9x	0.77	X	7.15	X	9	1.35	x	0.24	x	0.7		Ē	152.08	(75)	
Northeast 0.9x	0.77	X	7.15	X	9	7.38	x	0.24	x	0.7	=	• [162.13	(75)	
Northeast 0.9x	0.77	X	7.15	X	9	91.1	X	0.24	x	0.7	=	• [151.67	(75)	
Northeast 0.9x	0.77	X	7.15	X	7	2.63	X	0.24	x	0.7	=	• [120.91	(75)	
Northeast 0.9x	0.77	X	7.15	X	5	0.42	x	0.24	x	0.7	=	• [83.94	(75)	
Northeast 0.9x	0.77	X	7.15	x	2	8.07	X	0.24	x	0.7	-	• [46.73	(75)	
Northeast 0.9x	0.77	X	7.15	X	1	14.2	x	0.24	x	0.7	-	• [23.64	(75)	
Northeast 0.9x	0.77	X	7.15	x	9	9.21	x	0.24	x	0.7	=	- [15.34	(75)	
Southwest _{0.9x}	0.77	X	2.19	x	3	6.79]	0.24	x	0.7	=	· [9.38	(79)	
Southwest _{0.9x}	0.77	X	0.75	×	3	6.79]	0.24	×	0.7		• [3.21	(79)	
Southwest _{0.9x}	0.77	X	2.19	×	6	2.67	Ī	0.24	x	0.7		• [15.98	(79)	
Southwest _{0.9x}	0.77	x	0.75	x	6	2.67	ĺ	0.24	x	0.7	=	• [5.47	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	8	5.75	ĺ	0.24	x	0.7		Ē	21.86	(79)	
Southwest _{0.9x}	0.77	x	0.75	×	8	85.75		0.24	×	0.7		Ē	7.49	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	10	106.25		0.24	x	0.7	<u> </u>	Ē	27.09	(79)	
Southwest _{0.9x}	0.77	x	0.75	x	10	106.25		0.24	x	0.7	<u> </u>	· Ē	9.28	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	1	119.01		0.24	x	0.7	╡:	• Ē	30.34	(79)	
Southwest _{0.9x}	0.77	x	0.75	x	1	19.01	ĺ	0.24	x	0.7	<u> </u>	Ē	10.39	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	1	18.15	ĺ	0.24	x	0.7	╡ =	•	30.12	(79)	
Southwest _{0.9x}	0.77	x	0.75	x	1	18.15	ĺ	0.24	x	0.7	╡:	•	10.32	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	1	13.91	Ī	0.24	×	0.7	╡ =	• [29.04	(79)	
Southwest _{0.9x}	0.77	X	0.75	×	11	13.91]	0.24	×	0.7		• [9.95	(79)	
Southwest _{0.9x}	0.77	x	2.19	X	10	04.39]	0.24	×	0.7		• [26.62	(79)	
Southwest _{0.9x}	0.77	x	0.75	×	10	04.39		0.24	x	0.7		• [9.12	(79)	
Southwest _{0.9x}	0.77	X	2.19	X	9	2.85]	0.24	×	0.7		• [23.67	(79)	
Southwest _{0.9x}	0.77	x	0.75	×	9	2.85	Ī	0.24	×	0.7	╗ -	• [8.11	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	6	9.27]	0.24	×	0.7		• [17.66	(79)	
Southwest _{0.9x}	0.77	X	0.75	X	6	9.27]	0.24	×	0.7		• [6.05	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	4	4.07	Ī	0.24	×	0.7	╗ -	• [11.24	(79)	
Southwest _{0.9x}	0.77	x	0.75	x	4	4.07	ĺ	0.24	x	0.7	<u> </u>	· Ē	3.85	(79)	
Southwest _{0.9x}	0.77	x	2.19	×	3	1.49	ĺ	0.24	x	0.7	╡:	• Ē	8.03	(79)	
Southwest _{0.9x}	0.77	x	0.75	×	3	1.49	ĺ	0.24	x	0.7	-	• Ē	2.75	(79)	
							_		<u> </u>			_		_	
Solar gains i	n watts, calcul	lated	for each mo	nth_			(83)m	n = Sum(74)m .	(82)m		•	_			
(83)m= 31.38		.24	149.51 192		02.57	190.66	156	.65 115.73	70.44	38.72	26.12			(83)	
	internal and		` 									_			
(84)m= 374.88	3 401.44 429	9.62	464.25 490	.88 4	84.37	461.76	432	.76 400.27	371.8	359.4	361.08	3		(84)	

7. <u>M</u> e	an inter	nal tem <u>r</u>	perature	(heating	season)								
				· ·	n the livii	•	from Tab	ole 9, Th	1 (°C)				21	(85)
		•	•		ea, h1,m	_		,	. ,					`
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.99	0.98	0.94	0.83	0.69	0.74	0.91	0.98	0.99	1		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.4	19.53	19.78	20.15	20.53	20.82	20.94	20.92	20.69	20.23	19.76	19.38		(87)
Temp	erature	during h	eating p	eriods ir	rest of	dwelling	from Ta	ble 9, T	h2 (°C)					
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	1	0.99	0.99	0.97	0.9	0.74	0.53	0.58	0.85	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)	-	-		
(90)m=	17.61	17.79	18.16	18.7	19.23	19.6	19.7	19.69	19.46	18.83	18.14	17.58		(90)
									f	LA = Livin	g area ÷ (4) =	0.26	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	A) x T2			!		
(92)m=	18.07	18.24	18.58	19.07	19.56	19.91	20.02	20.01	19.77	19.19	18.55	18.04		(92)
		nent to t		<u> </u>	l I temper	ı ature fro	ı m Table	4e. whe	ere appro	noriate	l	<u> </u>		
(93)m=	18.07	18.24	18.58	19.07	19.56	19.91	20.02	20.01	19.77	19.19	18.55	18.04		(93)
		tina real	uirement											
•					re obtain	ed at ste	ep 11 of	Table 9l	o. so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•						, (
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:	_						_			
(94)m=	0.99	0.99	0.98	0.96	0.9	0.75	0.57	0.62	0.86	0.96	0.99	0.99		(94)
Usefu	ıl gains,	hmGm	W = (94)	4)m x (8	4)m					-	-	-		
(95)m=	372.26	397.41	421.86	444.95	439.91	365.46	262.04	269.86	343.42	358.7	355.2	358.92		(95)
Mont	hly aver	age exte	rnal tem	perature	from Ta	able 8				_				
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1134.95	1097.3	992.05	828.64	639.04	428	275.77	290.3	459.02	698.18	934.59	1133.31		(97)
Spac	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	4 x [(97)m – (95)m] x (4	1)m			
(98)m=	567.44	470.32	424.22	276.26	148.16	0	0	0	0	252.57	417.16	576.14		
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	3132.28	(98)
Spac	e heatin	g require	ement in	kWh/m²	²/year								56.33	(99)
8c. S	pace co	oling red	quiremer	nt										
Calcu	lated fo	r June, c	July and	August.	See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	757.83	596.59	611.66	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.72	0.81	0.77	0	0	0	0		(101)
												<u> </u>		

Useful loss, hmLm (Watts) = (100)m x (101)m		
	472.55 0 0 0 0 (1	02)
Gains (solar gains calculated for applicable weather region, see	Table 10)	
	,	03)
Space cooling requirement for month, whole dwelling, continuous set (104)m to zero if (104)m < 3 × (98)m	$(kWh) = 0.024 \times [(103)m - (102)m] \times (41)m$	
(104)m= 0 0 0 0 0 85.15	67.09 0 0 0	
	10000)	04)
Cooled fraction Intermittency factor (Table 10b)	f C = cooled area \div (4) = 0.68 (1)	05)
(106)m= 0 0 0 0 0.25 0.25	0.25 0 0 0 0	
	Total = Sum(1,04) = 0 (1	06)
Space cooling requirement for month = (104) m × (105) × (106) m		
(107)m= 0 0 0 0 0 14.55	11.46 0 0 0 0 0	07)
Change and ingregation and in UM/h/m²//agr		07)
Space cooling requirement in kWh/m²/year	$(107) \div (4) = 0.47$	08)
9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating	o provided by a community scheme	
Fraction of space heat from secondary/supplementary heating (T	• • • • • • • • • • • • • • • • • • • •	801)
Fraction of space heat from community system 1 – (301) =	1 (3	802)
The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. So		
Fraction of heat from Community CHP		803a)
Fraction of community heat from heat source 2	0.87	803b)
Fraction of total space heat from Community CHP	(302) x (303a) = 0.13	804a)
Fraction of total space heat from community heat source 2	$(302) \times (303b) = 0.87$	804b)
Factor for control and charging method (Table 4c(3)) for commun	ity heating system 1 (3	805)
Distribution loss factor (Table 12c) for community heating system	1.05 (3	806)
Space heating	kWh/year	
Annual space heating requirement	3132.28	
Space heat from Community CHP	(98) x (304a) x (305) x (306) = 427.56 (3	807a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) = 2861.34 (3	807b)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or Appendix E) 0 (3	808
Space heating requirement from secondary/supplementary syste	m $(98) \times (301) \times 100 \div (308) = 0$ (3	809)
Water heating		
Annual water heating requirement	1882.19	
If DHW from community scheme: Water heat from Community CHP	(64) x (303a) x (305) x (306) = 256.92 (3	310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) = 1719.38 (3	310b)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] = 52.65 (3	313)
Cooling System Energy Efficiency Ratio	4.73 (3	314)
	·	

Space cooling (if there is a fixed cooling system, if not enter	0) = (107) ÷ (314)	=	5.5	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	om outside		92.61	(330a)
warm air heating system fans	om catoliae		0	(330b)
pump for solar water heating			0	(330g)
	_(2200) + (220)	h) + (330a) -		╡` ¨
Total electricity for the above, kWh/year	=(330a) + (330b)	b) + (330g) =	92.61	(331)
Energy for lighting (calculated in Appendix L)			254.67	(332)
12b. CO2 Emissions – Community heating scheme Electrical efficiency of CHP unit			30.6	(361)
Heat efficiency of CHP unit			63	(362)
Tieat emoleticy of er in anit	Energy	Emission factor		(302)
	kWh/year	kg CO2/kWh	kg CO2/year	
Space heating from CHP) $(307a) \times 100 \div (362) =$	678.66 X	0.22	146.59	(363)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$	207.67 ×	0.52	-107.78	(364)
Water heated by CHP (310a) × 100 ÷ (362) =	407.81 ×	0.22	88.09	(365)
less credit emissions for electricity $-(310a) \times (361) \div (362) =$	124.79 ×	0.52	-64.77	(366)
Efficiency of heat source 2 (%)	using two fuels repeat (363) to	(366) for the second fu	el 96.7	(367b)
CO2 associated with heat source 2 [(307	7b)+(310b)] x 100 ÷ (367b) x	0.22	1023.2	(368)
Electrical energy for heat distribution	[(313) x	0.52	= 27.33	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372	2)	1112.66	(373)
CO2 associated with space heating (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from immersion heater or instanta	aneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		1112.66	(376)
CO2 associated with space cooling	(315) x	0.52	2.86	(377)
CO2 associated with electricity for pumps and fans within dw	velling (331)) x	0.52	48.06	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 132.18	(379)
Total CO2, kg/year sum of (376)(382) =			1295.75	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			23.3	(384)
El rating (section 14)			82.74	(385)

			User D	etails:						
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 20)12			a Num are Vei				016363 n: 1.0.4.10	
		Р	roperty .	Address	: Flat 0-1	I-Green				
Address :										
Overall dwelling dime	ensions:		Λ	n/m²\		Av. Ua	iaht/m\		Valuma/m³	`
Basement				a(m²) 13.25	(1a) x		ight(m) 3.1	(2a) =	Volume(m³) (3a)
Ground floor			6	33.89	(1b) x	2	2.6	(2b) =	166.11	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1r	1) 1	07.14	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	300.19	(5)
2. Ventilation rate:		_								
	main heating	secondar heating	у	other		total			m³ per hou	r
Number of chimneys	0 +	0] + [0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0] + [0	= [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns					0	X ·	10 =	0	(7a)
Number of passive vents	:					0	X	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
								Air ch	anges per ho	r
Infiltration due to chimne	vs_flues and fans =	(6a)+(6b)+(7	'a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	•				continue fr			. (3) =	0	(0)
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timbe	r frame or	0.35 fo	r mason	ry constr	uction			0	(11)
if both types of wall are p deducting areas of openi		esponding to	the great	ter wall are	a (after					
If suspended wooden	= :	aled) or 0.	1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0)							0	(13)
Percentage of windows	s and doors draught	stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in co	ubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) =	$(17) \div 20] + (8)$	3), otherw	ise (18) =	(16)				0.15	(18)
Air permeability value applie	•	as been dor	e or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere	ed			(00) 4	[0 07F /4	10)1			2	(19)
Shelter factor				` '	[0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporat	_	- d		(21) = (18) X (20) =				0.13	(21)
Infiltration rate modified f	- 		Jul	۸۰۰۰	Sep	Oct	Nov	Dec		
Jan Feb	Mar Apr Mag	/ Jun	Jui	Aug	l Seb	l Oct	INOV	Dec		
Monthly average wind sp		2.0	2.0	2.7	1 4	4.0	4.5	47	1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		

Wind Factor (22a)m = ((22)m ÷	4										
(22a)m= 1.27 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate	e (allowii	na for sh	elter an	d wind s	need) =	(21a) x	(22a)m	•	•			
0.16 0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effective air c		rate for t				<u> </u>	<u> </u>					
If mechanical ventilat											0.5	(23a)
If exhaust air heat pump u	•	,	, ,	,	. ,		,) = (23a)		l	0.5	(23b)
If balanced with heat recov	-	-	_								76.5	(23c)
a) If balanced mecha					- `	- ` ` - 	ŕ	- ^ `		``	÷ 100]	(2.1.)
(24a)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(24a)
b) If balanced mecha	-					<u> </u>	í `	 	- 		l	(0.41.)
(24b)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house ext			•	-				5 v (22h	.\			
(24c)m =	(230), (1	nen (240	(230) = (230)	o), otherv	0	C) = (221)	0	.5 × (23L	0	0		(24c)
d) If natural ventilatio												(210)
if (22b)m = 1, the								0.5]				
(24d)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change r	rate - en	ter (24a	or (24b	o) or (240	c) or (24	d) in box	· (25)	•			l	
(25)m= 0.28 0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
Heat losses and heat	at loss p	paramete	er:									
3. Heat losses and heat ELEMENT Gross area (S	oaramete Openin m	gs	Net Ar		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gross	S	Openin	gs						<) 			
ELEMENT Gross area (S	Openin	gs	A ,n	m² x	W/m2	=	(W/I	<) 			kJ/K
ELEMENT Gross area (S	Openin	gs	A ,n	m ² x	W/m2	eK = 0.04] =	(W/I	<) 			kJ/K (26)
ELEMENT Gross area (Doors Windows Type 1	S	Openin	gs	A ,n	m ² x x1/	W/m2 1.2 /[1/(1.2)+	0.04] = 0.04] =	(W/I 3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (Doors Windows Type 1 Windows Type 2	S	Openin	gs	A ,n 2.6 13.52 2.73	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13	<) 			kJ/K (26) (27) (27)
ELEMENT Gross area (Doors Windows Type 1 Windows Type 2 Windows Type 3	S	Openin	gs	A ,n 2.6 13.52 2.73 4.16	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	S	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	S	Openin	gs	A ,n 2.6 13.52 2.73 4.16 7.54 3.51	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/I 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	s (m²)	Openin	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575				(26) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	s (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.11	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 T73.32 Walls Type2 20.68	s (m²)	Openin m	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 43.4	s (m²)	34.06 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	0.04] = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4	s (m²)	34.00 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = =	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 6.27	s (m²)	34.00 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.42	s (m²)	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.42 Roof Type2 4.83	s (m²)	34.00 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42 4.83	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = 0.04] = = 0.04] = = 0.04] = = 0.04]	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 Walls Type4 Walls Type5 Roof Type1 11.42	s (m²)	34.06 0 0 0	gs ²	A ,n 2.6 13.52 2.73 4.16 7.54 3.51 43.25 31.9 43.26 20.68 43.4 28.22 6.27 11.42	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K	(W/I 3.12 15.48 3.13 4.76 8.63 4.02 4.7575 3.509 6.49 3.1 6.51 4.23 0.94				(26) (27) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)

Party of	eilina					59.06	,				Г			(32b)
-	•	roof wind	ows, use e	effective wi	indow U-va			formula 1	/[(1/U-valu	e)+0.04] a	L as given in	paragraph		(320)
			sides of in		ls and part	titions		(00) (00)	. (00)			г		_
			= S (A x	U)				(26)(30)	, ,	(00) (0)	a) (00)	(00.)	71.12	(33)
		Cm = S(TE 4) '.	. 1. 1/217			., ,	. , ,	2) + (32a).	(32e) = [34247.85	(34)
		•	•		,	n kJ/m²K		o o io o ly 4h c		tive Value		blo 1f	250	(35)
	•		ere tne de tailed calci		CONSTRUCT	ion are not	r known pr	ecisely the	indicative	values of	TMP in Ta	able 11		
Therm	al bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<						36.66	(36)
if details	of therma	ıl bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			107.78	(37)
Ventila	tion hea		alculated	d monthly	У	ı	i	i		= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.74	27.43	27.11	25.53	25.22	23.64	23.64	23.32	24.27	25.22	25.85	26.48		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	135.52	135.21	134.89	133.31	133	131.42	131.42	131.1	132.05	133	133.63	134.26		_
Heat lo	oss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	133.24	(39)
(40)m=	1.26	1.26	1.26	1.24	1.24	1.23	1.23	1.22	1.23	1.24	1.25	1.25		
			<u> </u>	<u> </u>	<u> </u>	<u> </u>			/	Average =	Sum(40) ₁ .	12 /12=	1.24	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)	i	i	r	r			i	· · · · · ·		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m =	31	28	31	30	31	30	1 04							(41)
			"] 30] 31	30	31	31	30	31	30	31		(41)
			01] 30] 31	30	31	31	30	31	30	31		(41)
4. Wa	iter heat		rgy requi			30	31	31	30	31	30	kWh/ye	ear:	(41)
			rgy requi			30	31	31	30	31			ear:	
Assum if TF	ied occu A > 13.9	ing ener	rgy requi	irement:		30 349 x (TF					2	kWh/ye	ar:	(42)
Assum if TF if TF	ed occu A > 13.9 A £ 13.9	ing ener pancy, I 9, N = 1 9, N = 1	rgy requi N + 1.76 x	irement:	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (T		9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ing energipancy, I D, N = 1 D, N = 1 e hot wa	rgy requi N + 1.76 x	irement: [1 - exp	-(-0.0003 es per da		FA -13.9) erage =)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ing energy, I pancy, I 9, N = 1 9, N = 1 e hot was al average	rgy requi N + 1.76 x ater usag hot water	irement: [1 - exp ge in litre usage by:	(-0.0003 es per da 5% if the a	349 x (TF	FA -13.9 erage = designed t)2)] + 0.0 (25 x N)	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ar:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av dwelling is thot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36	ΓFA -13.	9)	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month	es per da 5% if the d vater use, I	349 x (TF ay Vd,av welling is hot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua e that 125	ing energipancy, I pancy, I p, N = 1 p, N = 1 e hot wa la average litres per p	rgy requi N + 1.76 x ater usag hot water person per Mar	irement: [1 - exp ge in litre usage by a r day (all w	es per da 5% if the d vater use, I	349 x (TF ay Vd,av dwelling is thot and co	FA -13.9 erage = designed t ld))2)] + 0.0 (25 x N) to achieve	0013 x (7 + 36 a water us	ΓFA -13. se target o	9) 100	kWh/ye	ear:	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	irement: [1 - exp ge in litre usage by a day (all w Apr ach month	es per da 5% if the a rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	0013 x (7 + 36 a water us Sep	ΓFA -13. se target o Oct 102.63 Fotal = Su	9) 100 Nov 106.65 m(44)112 =	kWh/ye .8 0.62 Dec 110.68	ear: 1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual of that 125 Jan er usage in	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61	es per da 5% if the a vater use, I May Vd,m = fa 94.58	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	98.61	ΓFA -13. See target of Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occur A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ing energy, Ipancy, Ip	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea	irement: [1 - exp ge in litre usage by a day (all w Apr ach month	es per da 5% if the a rater use, I May Vd,m = far 94.58	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58	9013 x (7 + 36 a water us Sep 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 110.68 content of	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63 used - calc	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 culated mo	o(-0.0003 es per da 5% if the of vater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,ave Iwelling is that and co. Jun ctor from 7 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	106.65 m(44) ₁₁₂ = ables 1b, 1	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96		(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m=	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy I panc	rgy requi N + 1.76 x ater usag hot water person per Mar r day for ea 102.63 used - calc	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 culated mo	o(-0.0003 es per da 5% if the of vater use, I May Vd,m = far 94.58 onthly = 4.	349 x (TF ay Vd,av fwelling is that and con Jun ctor from T 90.56	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71	98.61 98.61 98.61	Oct 102.63 Fotal = Su th (see Ta	Nov 106.65 m(44)12 = ables 1b, 1 146.38	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(42)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage	ing energy pancy, I pancy, I pancy, I pancy, I pancy p	rgy requi N + 1.76 x ater usag hot water person per Mar day for ea 102.63 used - calc 148.13	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 [129.15] [13.37]	es per da 5% if the orater use, I May Vd,m = fa: 94.58 onthly = 4. 123.92 o hot water 18.59	349 x (TF ay Vd,ave liwelling is that and co. Jun ctor from 7 90.56 190 x Vd,ri 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthal 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum	ing energy, Inpancy,	rgy requivalent of the second	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 [129.15] for use (not) 19.37 and any so	es per da 5% if the of vater use, I May Vd, m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or W	349 x (TF ay Vd,ave fwelling is a hot and con Jun ctor from T 90.56 190 x Vd,re 106.93 r storage), 16.04	erage = designed to ld) Jul Fable 1c x 90.56 m x nm x E 99.09 enter 0 in 14.86 storage	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11	Nov 106.65 m(44) ₁₁₂ = ables 1b, 1 146.38 m(45) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68 c, 1d) 158.96	1207.41	(42) (43) (44)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water Storag If comit	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy pancy, I pancy, I pancy, I pancy, I pancy parce p	rgy required to the second required to the second reperson per second reperson per second reperson reperson per second reperson reperson reperson per second reperson per second reperson per second reperson per second reperson re	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 for use (not 19.37 and any so ank in dw	es per da 5% if the of water use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water velling, e	349 x (TF ay Vd,ave liwelling is that and co. Jun ctor from 7 90.56 190 x Vd,ri 106.93 r storage),	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy ((45)m= If instan (46)m= Water Storag If comit Othery	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan arrusage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity h	ing energy, Inpancy,	rgy required to the second required to the second reperson per second reperson per second reperson reperson reperson per second reperson r	irement: [1 - exp ge in litre usage by a day (all w Apr ach month 98.61 129.15 for use (not 19.37 and any so ank in dw	es per da 5% if the of water use, I May Vd,m = fact 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water velling, e	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to designed t	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comin Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 110.68 content of 164.13 taneous w 24.62 storage e volum munity he wise if no storage	ing energy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy, I pancy energy Feb palitres per 106.65 hot water 143.55 ater heatin 21.53 loss: e (litres) eating a pater stored loss:	rgy required in the state of th	irement: [1 - exp ge in litre usage by a r day (all w Apr ach month 98.61 [29.15] [20.15] [30.16] [40.17] [50.18] [60.18] [60.18] [70.1	es per da 5% if the a vater use, I May Vd, m = far 94.58 onthly = 4. 123.92 o hot water 18.59 olar or Water use, III.	349 x (TF ay Vd,ave dwelling is that and co. Jun ctor from 7 90.56 190 x Vd,r 106.93 r storage), 16.04	erage = designed to ld) Jul Fable 1c x 90.56 m x nm x D 99.09 enter 0 in 14.86 storage litres in neous co	(25 x N) to achieve Aug (43) 94.58 97m / 3600 113.71 boxes (46) 17.06 within sa (47)	98.61 98.61 115.06 17.26	Oct 102.63 Fotal = Su 134.1 Fotal = Su 20.11 sel	Nov 106.65 m(44) ₁₁₂ = 21.96 47)	kWh/ye .8 0.62 Dec 110.68	1207.41	(42) (43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) =$	110	(50)
b) If manufacturer's declared cylinder loss factor is not known	:		· I
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3		0.02	(51)
Volume factor from Table 2a		1.03	(52)
Temperature factor from Table 2b		0.6	(53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	1.03	(54)
Enter (50) or (54) in (55)		1.03	(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$		
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57) m = (56) m where $($	H11) is from Append	ix H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(57)
Primary circuit loss (annual) from Table 3		0	(58)
Primary circuit loss calculated for each month (59) m = $(58) \div 3$	365 × (41)m		I
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder thermo	stat)	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.26	22.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) \div 365 × (4	1)m	-	'
(61)m= 0 0 0 0 0 0 0	0 0 0	0 0	(61)
Total heat required for water heating calculated for each mont	$h (62)m = 0.85 \times (45)m +$	(46)m + (57)m +	(59)m + (61)m
(62)m= 219.41 193.48 203.41 182.64 179.2 160.43 154.37	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 	199.87 214.23	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan)
(add additional lines if FGHRS and/or WWHRS applies, see A		ion to water neating)	
(63)m= 0 0 0 0 0 0 0 0	0 0 0	0 0	(63)
Output from water heater	<u> </u>	l l	,
(64)m= 219.41 193.48 203.41 182.64 179.2 160.43 154.37	168.98 168.56 189.37	199.87 214.23	
	Output from water heate	r (annual) ₁₁₂	2233.94 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m	1
(65)m= 98.8 87.67 93.48 85.74 85.42 78.35 77.17	82.03 81.05 88.81	91.47 97.07	(65)
include (57)m in calculation of (65)m only if cylinder is in the	1 1	rom community h	l neating
5. Internal gains (see Table 5 and 5a):	arraming of flot water to the	om community :	- Calling
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep Oct	Nov Dec	
(66)m= 139.83 139.83 139.83 139.83 139.83 139.83 139.83	 	139.83 139.83	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a),		10000	` '
(67)m= 23.84 21.17 17.22 13.04 9.74 8.23 8.89	11.55 15.51 19.69	22.98 24.5	(67)
Appliances gains (calculated in Appendix L, equation L13 or L	 		(*)
(68)m= 267.38 270.16 263.16 248.28 229.49 211.83 200.03		237.92 255.58	(68)
` '		257.52 255.50	(00)
Cooking gains (calculated in Appendix L, equation L15 or L15 (69)m= 36.98 36.98 36.98 36.98 36.98 36.98 36.98	36.98 36.98 36.98	36.98 36.98	(69)
	30.30 30.30 30.36	30.90 30.98	(00)
Pumps and fans gains (Table 5a)			(70)
(70)m= 0 0 0 0 0 0 0	0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	144.00 444.00 444.00	444.00	(74)
(71)m= -111.86 -111.86 -111.86 -111.86 -111.86 -111.86 -111.86	6 -111.86 -111.86 -111.86	-111.86 -111.86	(71)

Water heatin	g gains (T	able 5)												
(72)m= 132.7	9 130.47	125.64	119.08	114.82	10	8.82	103.72	110	.25 112.57	119.3	37 127.03	130.48]	(72)
Total interna	al gains =					(66)n	n + (67)m	+ (68	3)m + (69)m +	· (70)m -	- (71)m + (72))m	•	
(73)m= 488.9	6 486.74	470.97	445.34	419	39	3.82	377.59	384	.01 397.28	423.	452.89	475.51]	(73)
6. Solar gai	ns:													
Solar gains are	e calculated	using sola	r flux from	Table 6a	and a	associa	ted equa	tions	to convert to t	he appli	cable orienta	tion.		
Orientation:	Access F Table 6d		Area m²			Flux Tab	le 6a		g_ Table 6b)	FF Table 6c		Gains (W)	
Northeast 0.9	0.54	Х	13.	52	x	11	.28	x	0.24	x	0.7	=	12.46	(75)
Northeast 0.9	0.77	х	2.7	73	x	11	.28	x	0.24	x	0.7	=	3.59	(75)
Northeast 0.9	0.77	х	4.1	6	x	11	.28	x	0.24	x	0.7	=	5.46	(75)
Northeast 0.9	0.54	X	13.	52	x	22	.97	x	0.24	x	0.7	=	25.35	(75)
Northeast 0.9	0.77	х	2.7	' 3	x	22	.97	x	0.24	X	0.7	=	7.3	(75)
Northeast 0.9	0.77	х	4.1	6	x	22	97	x	0.24	X	0.7	=	11.12	(75)
Northeast 0.9	0.54	х	13.	52	x	41	.38	x	0.24	X	0.7	=	45.68	(75)
Northeast 0.9	0.77	Х	2.7	73	x	41	.38	X	0.24	X	0.7	=	13.15	(75)
Northeast 0.9	0.77	х	4.1	6	x	41	.38	x	0.24	X	0.7	=	20.04	(75)
Northeast 0.9	0.54	х	13.	52	x	67	.96	x	0.24	X	0.7	=	75.02	(75)
Northeast 0.9	0.77	Х	2.7	' 3	x	67	.96	X	0.24	X	0.7	=	21.6	(75)
Northeast 0.9	0.77	х	4.1	6	x	67	.96	x	0.24	X	0.7	=	32.91	(75)
Northeast 0.9	0.54	Х	13.	52	x	91	.35	X	0.24	X	0.7	=	100.84	(75)
Northeast 0.9	0.77	Х	2.7	73	x	91	.35	X	0.24	X	0.7	=	29.03	(75)
Northeast 0.9	0.77	Х	4.1	6	x	91	.35	X	0.24	X	0.7	=	44.24	(75)
Northeast 0.9	0.54	Х	13.	52	x	97	.38	X	0.24	X	0.7	=	107.5	(75)
Northeast 0.9	0.77	Х	2.7	73	x	97	.38	X	0.24	x	0.7	=	30.95	(75)
Northeast 0.9	0.77	Х	4.1	6	x	97	.38	X	0.24	X	0.7	=	47.17	(75)
Northeast 0.9	0.54	Х	13.	52	x	9	1.1	X	0.24	X	0.7	=	100.56	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	9	1.1	X	0.24	X	0.7	=	28.96	(75)
Northeast 0.9	0.77	х	4.1	6	x	9	1.1	x	0.24	X	0.7	=	44.12	(75)
Northeast 0.9	0.54	Х	13.	52	x	72	.63	X	0.24	X	0.7	=	80.17	(75)
Northeast 0.9	0.77	Х	2.7	73	x	72	.63	X	0.24	x	0.7	=	23.08	(75)
Northeast 0.9	0.77	Х	4.1	6	x	72	.63	X	0.24	X	0.7	=	35.17	(75)
Northeast 0.9	0.54	Х	13.	52	x	50	.42	X	0.24	X	0.7	=	55.66	(75)
Northeast 0.9	0.77	X	2.7	' 3	x	50	.42	X	0.24	X	0.7	=	16.03	(75)
Northeast 0.9	0.77	Х	4.1	6	x	50	.42	X	0.24	X	0.7	=	24.42	(75)
Northeast 0.9	0.54	X	13.	52	x	28	.07	X	0.24	X	0.7	=	30.98	(75)
Northeast 0.9	0.77	х	2.7	73	x [28	.07	x	0.24	x	0.7	=	8.92	(75)
Northeast 0.9	0.77	X	4.1	6	x	28	.07	x	0.24	X	0.7	=	13.59	(75)
Northeast 0.9	0.54	х	13.	52	x [14	4.2	x	0.24	X	0.7	=	15.67	(75)
Northeast 0.9	0.77	x	2.7	73	x	14	4.2	X	0.24	X	0.7	=	4.51	(75)

Northeast _{0.9x}	0.77	x	4.1	6	хГ		14.2	x		0.24		0.7		=	6.88	(75)
Northeast _{0.9x}	0.54	X	13.		x F		9.21	X	<u> </u>	0.24		0.7	〓	=	10.17	(75)
Northeast _{0.9x}	0.77	X	2.7		x F		9.21	X	_	0.24		0.7	〓	=	2.93	(75)
Northeast _{0.9x}	0.77	X	4.1		x F		9.21	X		0.24	x	0.7	〓	=	4.46	(75)
Southeast _{0.9x}	0.77	x	3.5		x F		6.79	X	_	0.24	x	0.7	一	=	15.04	(77)
Southeast _{0.9x}	0.77	X	3.5		x F		2.67	X	_	0.24	_	0.7	〓	=	25.61	(77)
Southeast 0.9x	0.77	X	3.5		x [5.75	X		0.24	x	0.7	=	=	35.04	(77)
Southeast 0.9x	0.77	X	3.5		x F		06.25	X	<u> </u>	0.24	x	0.7	=	=	43.42	(77)
Southeast 0.9x	0.77	X	3.5	51	x [1	19.01	X		0.24	T x	0.7	=	=	48.63	(77)
Southeast 0.9x	0.77	X	3.5		x [18.15	X	_	0.24	x	0.7	=	=	48.28	(77)
Southeast 0.9x	0.77	X	3.5		x [13.91	X		0.24	×	0.7	=	=	46.55	(77)
Southeast 0.9x	0.77	X	3.5		x [04.39	X		0.24	x	0.7	=	=	42.66	(77)
Southeast 0.9x	0.77	X	3.5		x F		2.85	X	_	0.24	x	0.7	\dashv	=	37.94	(77)
Southeast 0.9x	0.77	X	3.5		x F		9.27	X	_	0.24	x	0.7	=	=	28.31	(77)
Southeast _{0.9x}	0.77	X	3.5		x F		4.07	X		0.24		0.7	〓	=	18.01	(77)
Southeast _{0.9x}	0.77	X	3.5		x F		1.49	X	_	0.24		0.7	〓	_	12.87	(77)
Southwest _{0.9x}	0.77	X	7.5		x F		6.79	! 		0.24	_	0.7	〓	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		2.67	! 		0.24		0.7	〓	=	55.02	(79)
Southwest _{0.9x}	0.77	x	7.5		x F		5.75	! 	_	0.24	x	0.7	一	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		06.25) 	_	0.24	x	0.7	=	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		19.01	! 		0.24		0.7	〓	=	104.47	(79)
Southwest _{0.9x}	0.77	x	7.5		x F		18.15	! 	_	0.24	x	0.7	一	=	103.72	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		13.91	! 	_	0.24	_	0.7	〓	_	99.99	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		04.39	! 		0.24		0.7	╡	_	91.64	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		2.85	! 		0.24	_	0.7	〓	_	81.51	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		9.27	! 	 	0.24	_	0.7	〓	=	60.81	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		4.07	! 		0.24		0.7	〓	=	38.69	(79)
Southwest _{0.9x}	0.77	X	7.5		x F		1.49	! 	_	0.24	x	0.7	〓	=	27.64	(79)
_					L			ı								(
Solar gains in	watts, ca	lculated	for eacl	h month	1			(83)m	ı = Suı	m(74)m	(82)m					
(83)m= 68.84	124.4	189.19	266.22	327.21	_	7.62	320.19	272	.73	215.56	142.61	83.76	58.0)7		(83)
Total gains – i	nternal a	nd solar	(84)m =	= (73)m	+ (83	3)m	, watts									
(84)m= 557.8	611.15	660.16	711.56	746.21	731	1.44	697.78	656	.74	612.84	565.75	536.64	533.	58		(84)
7. Mean inter	nal temp	erature	(heating	seasor	n)											
Temperature	during h	eating p	eriods ir	the liv	ing a	rea f	from Tab	ole 9,	, Th1	(°C)					21	(85)
Utilisation fac	tor for ga	ains for I	iving are	ea, h1,n	ı (se	е Та	ble 9a)									_
Jan	Feb	Mar	Apr	May	J	un	Jul	A	ug	Sep	Oct	Nov	De	ЭС		
(86)m= 1	1	1	0.99	0.96	0.	88	0.74	0.7	79	0.94	0.99	1	1			(86)
Mean interna	l tempera	ature in I	iving are	ea T1 (f	ollow	v ste	ps 3 to 7	in T	able	9c)						
(87)m= 19.54	19.65	19.88	20.22	20.55	20	.83	20.95	20.	93	20.71	20.29	19.86	19.5	52		(87)
Temperature	during h	eating p	eriods ir	rest of	dwe	elling	from Ta	ble 9	 9, Th	 2 (°C)						
(88)m= 19.87	19.87	19.87	19.88	19.89	1	9.9	19.9	19.		19.89	19.89	19.88	19.8	38		(88)
	!				•							•	•		•	

Utilisa	ation fac	tor for a	ains for	rest of d	wellina. I	n2.m (se	ee Table	9a)						
(89)m=	1	1	0.99	0.98	0.94	0.81	0.6	0.66	0.9	0.99	1	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 1	7 in Tabl	e 9c)				
(90)m=	17.92	18.09	18.43	18.92	19.4	19.76	19.88	19.87	19.63	19.03	18.4	17.9		(90)
									f	LA = Livin	g area ÷ (4	1) =	0.15	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	ling) = fl	LA × T1	+ (1 – fL	.A) × T2					_
(92)m=	18.15	18.32	18.64	19.11	19.57	19.92	20.03	20.02	19.79	19.22	18.62	18.13		(92)
Apply	adjustn	nent to tl	he mean	internal	temper	ature fro	m Table	4e, whe	re appro	priate				
(93)m=	18.15	18.32	18.64	19.11	19.57	19.92	20.03	20.02	19.79	19.22	18.62	18.13		(93)
8. Sp	ace hea	ting requ	uirement											
			ernal ter or gains			ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	1	0.99	0.98	0.93	0.81	0.62	0.67	0.9	0.98	1	1		(94)
Usefu	ıl gains,	hmGm ,	, W = (94	4)m x (84	4)m					•				
(95)m=	556.42	608.62	654.5	695.26	695.66	590.73	429.55	441.82	550.66	555.4	534.2	532.52		(95)
	<u> </u>		rnal tem											(00)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern 1637.87				=[(39)m : 451.17	x [(93)m 474.71	- (96)m 750.9	1146	1538.97	1870.88		(97)
. ,							th = 0.02			l .		1070.00		(01)
(98)m=	982.84	810.37	731.62	479.36	260.93	0	0	0	0	439.41	723.43	995.74		
. ,								Tota	l per year	l (kWh/yeaı) = Sum(9	8) _{15,912} =	5423.71	(98)
Spac	e heatin	g require	ement in	kWh/m²	/year							·	50.62] (99)
9h Fn	erav rec	uiremer	nts – Cor	nmunity	heating	scheme								
					The state of the s		ater heat	ing prov	ided by	a comm	unity sch	neme.		
				• .		-	neating (• .	-		·		0	(301)
Fraction	n of spa	ce heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme mag	y obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and เ	up to four	other heat	sources; tl	he latter	
			-		aste heat f	rom powe	r stations.	See Appei	ndix C.			ı	0.40	7(2020)
			Commun									<u> </u> 	0.13	(303a)
		-	heat fro			up.				(0	00) (000	- \	0.87	(303b)
		•	heat fro		•		•				02) x (303		0.13	(304a)
		•	heat fro		•					•	02) x (303	b) =	0.87	(304b)
					•	. ,,	r commu	-	iting sys	tem		ļ	1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	communi	ity heatii	ng syste	m					1.05	(306)
-	heating	-										ſ	kWh/year	7
	•	_	requirem										5423.71	_
Space	heat fro	m Comr	munity C	HP					(98) x (30	04a) x (30	5) x (306) =	=	740.34	(307a)

					_
Space heat from heat source 2		(98) x (304b) x	(305) x (306) =	4954.56	(307b)
Efficiency of secondary/supplement	ntary heating system in % (from Table 4a or Appe	ndix E)	0	(308
Space heating requirement from se	econdary/supplementary sy	ystem (98) x (301) x	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2233.94	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x	(305) x (306) =	304.93	(310a)
Water heat from heat source 2		(64) x (303b) x	(305) x (306) =	2040.71	(310b)
Electricity used for heat distribution	n	0.01 × [(307a)(30	7e) + (310a)(310e)] =	80.41	(313)
Cooling System Energy Efficiency	Ratio			0	(314)
Space cooling (if there is a fixed co	poling system, if not enter 0	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within mechanical ventilation - balanced,	- ,	m outside		247.21	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (330	0b) + (330g) =	247.21	(331)
Energy for lighting (calculated in A	ppendix L)			420.97	(332)
Electricity generated by PVs (Appe	endix M) (negative quantity))		-228.98	(333)
Electricity generated by wind turbing	ne (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions - Community	heating scheme				
•	riodaing continu				
Electrical efficiency of CHP unit	Trodding Continue			30.6	(361)
·	Trouting continu			30.6	(361)
Electrical efficiency of CHP unit	Trouting continu	Energy	Emission factor	63 Emissions	
Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	Emission factor	63	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =			63 Emissions	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$	kWh/year	0.22	63 Emissions kg CO2/year 253.83	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year 1175.14 × 359.59 ×	0.22 0.52	63 Emissions kg CO2/year 253.83 -186.63	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 1175.14	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87	(362) (363) (364) (365)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 1175.14 × 359.59 × 484.02 × 148.11 ×	0.22 0.52 0.52 0.52 0.52 0 (366) for the second fu	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87	(362) (363) (364) (365) (366)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 1175.14	0.22 0.52 0.52 0.52 0.52 0.52 0.6366) for the second fu	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7	(362) (363) (364) (365) (366) (367b)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 1175.14	0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54	(362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54 = 41.73	(362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems g (secondary)	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54 = 41.73 = 1699.15	(362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems g (secondary) nmersion heater or instanta	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54 = 41.73 = 1699.15 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems g (secondary) nmersion heater or instantal and water heating	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 0.22 0.52 0.52 0.22 0.52 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54 = 41.73 = 1699.15 = 0 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems g (secondary) nmersion heater or instantal and water heating pumps and fans within dwe	kWh/year 1175.14	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 253.83 -186.63 104.55 -76.87 el 96.7 = 1562.54 = 41.73 = 1699.15 = 0 1699.15	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)

Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) -118.84 0.52 sum of (376)...(382) = Total CO2, kg/year (383) 1927.1 $(383) \div (4) =$ **Dwelling CO2 Emission Rate** 17.99 (384) El rating (section 14) (385)83.03

			User [Details:						
Assessor Name: Software Name:	Chris Hock Stroma FS	-		Strom Softwa					016363 on: 1.0.4.10	
Software Name.	Ottoma i O		Property					VCISIC	лт. т.о. ч .то	
Address :										
1. Overall dwelling dime	ensions:									
			Are	a(m²)	_	Av. He	ight(m)	_	Volume(m³	<u>)</u>
Basement			4	13.37	(1a) x	3	3.1	(2a) =	134.45	(3a)
Ground floor			(66.91	(1b) x	2	2.6	(2b) =	173.97	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	In) 1	10.28	(4)			_		
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	308.41	(5)
2. Ventilation rate:										
	main heating	seconda heating		other		total			m³ per hou	r
Number of chimneys	0	+ 0	+ [0	 =	0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	- +	0	 	0	x	20 =	0	(6b)
Number of intermittent fa	ans					0	x ·	10 =	0	(7a)
Number of passive vents	5					0	x	10 =	0	(7b)
Number of flueless gas f	ires					0	x	40 =	0	(7c)
· ·					L					` ′
								Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = $(6a)+(6b)+$	(7a)+(7b)+	(7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has l		•	ed to (17),	otherwise (continue fr	om (9) to ((16)			_
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration	05 (20 24 24 24 24	Carl and Carre	0 05 (-				[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0 if both types of wall are p					•	uction			0	(11)
deducting areas of openi			to the grea	ior wan are	a (anoi					
If suspended wooden	floor, enter 0.2	(unsealed) or	0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2		_			0	(15)
Infiltration rate						12) + (13) -			0	(16)
Air permeability value,				•	•	etre of e	nvelope	area	3	(17)
If based on air permeabi Air permeability value applie	•					is heina u	sed		0.15	(18)
Number of sides sheltere		n toot nao boon at	one or a ac	gree an pe	modbinty	io boiling at	30 u		3	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified	for monthly win	d speed								
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table	= 7							-	
(22)m = 5.1 5	40 44	42 20	1 20	2.7	1	4.2	1.5	4.7	1	

4.3

3.8

3.8

3.7

4.5

4.7

Wind Factor (22a)m = (22)n	n ÷ 4									
(22a)m= 1.27 1.25 1.25		.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltration rate (all	uving for shalt	or and wind a		(21a) v ((22a)m	!		<u>.</u>	l	
Adjusted infiltration rate (allo		.12 0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air chang		l l	1	0.11	0.12	0.12	0.10	0.11		
If mechanical ventilation:									0.5	(23a)
If exhaust air heat pump using A) = (23a)			0.5	(23b)
If balanced with heat recovery:	•	•	,	·		Ola)	001-) [(00-)	76.5	(23c)
a) If balanced mechanica (24a)m= 0.27 0.26 0.20		n neat recov .24 0.23	ery (MV)	HR) (24a _{0.23}	m = (2) 0.23	2b)m + (2 0.24	23b) x [²	0.25	÷ 100] 	(24a)
b) If balanced mechanica		ļ	ļ	LI				0.23		(244)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 0		0	0	0	0	0	0		(24b)
c) If whole house extract				ا	utside					, ,
if $(22b)m < 0.5 \times (23b)$	•	-				.5 × (23b)			
(24c)m= 0 0 0	0	0 0	0	0	0	0	0	0		(24c)
d) If natural ventilation or										
if $(22b)m = 1$, then $(24b)m = 1$				- ``						(244)
(24d)m= 0 0 0	0	0 0	0	0	0 (05)	0	0	0		(24d)
Effective air change rate - (25)m= 0.27 0.26 0.20		.24 0.23	c) or (24 0.23	0.23	0.23	0.24	0.25	0.25		(25)
(20)111- 0.27 0.20 0.20	0.20 0	0.20	0.20	0.20	0.20	0.24	0.20	0.20		(=3)
3. Heat losses and heat los	·	N 1 4 A				A 3/11				A 3/ 1
3. Heat losses and heat los ELEMENT Gross area (m²)	os parameter: Openings m²	Net Ar A ,ı		U-valu W/m2		A X U (W/I	<)	k-value kJ/m²-ł		A X k kJ/K
ELEMENT Gross	Openings						<)			
ELEMENT Gross area (m²)	Openings	, A	m ²	W/m2	K =	(W/I	<) 			kJ/K
ELEMENT Gross area (m²) Doors	Openings	A ,ı	m² x 2 x ¹ / ₂	W/m2	K = 0.04] =	(W/F	<) 			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	Openings	A ,1 2.6	m ² x 2 x ¹ / ₃ x 1/ ₄	W/m2 1.2 /[1/(1.2)+	K = 0.04] = 0.04] =	3.12 15.48	<) 			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	Openings	2.6 13.52 2.73	m ² x 2 x ¹ / ₃ x ¹ / ₃ x ¹ / ₃	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	K = 0.04] = 0.04] = 0.04] =	3.12 15.48 3.13	<)			(26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	Openings	A ,1 2.6 13.52 2.73 4.16	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/F 3.12 15.48 3.13 4.76	<)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63				kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5	Openings	A ,1 2.6 13.52 2.73 4.16 7.54	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02				kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1	Openings	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11	K	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1	Openings m ²	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15	K	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 3.2	Openings m² 34.06	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3	Openings m² 34.06 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46				kJ/K (26) (27) (27) (27) (27) (27) (28) (28) (29) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 1 Floor Type 2 Walls Type1 44.81 Walls Type2 3.2 Walls Type3 43.07 Walls Type4 28.33	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.79 3.2 43.03	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type4 Walls Type5 Floor Type 5 Floor Type 1	34.06 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.11 10.75 3.2 43.07 28.33	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30)
Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Windows Type 5 Floor Type 1 Floor Type 2 Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type4 Walls Type4 See See See See See See See See See See	34.06 0 0 0	A ,1 2.6 13.52 2.73 4.16 7.54 3.51 43.33 34.1 10.79 3.2 43.00 28.33 56.99 10.55	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.11 0.15 0.15 0.15 0.15 0.15	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = =	(W/N 3.12 15.48 3.13 4.76 8.63 4.02 4.7707 3.7521 1.61 0.48 6.46 4.25 8.54 1.59				kJ/K (26) (27) (27) (27) (27) (28) (28) (29) (29) (29) (29) (29) (30) (30)

Party of	eilina					62.16					Г		-	(32b)
-	•	roof winde	ows, use e	effective wi	ndow U-va			ı formula 1,	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		(02.5)
					ls and part					, -	-			
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				71.31	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	39475.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm -	- TFA) ir	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•		ere the de tailed calci		constructi	ion are not	known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
					using Ap	nendix k	<					I	37.2	(36)
	•	,	,		= 0.15 x (3	•	•					l	51.2	(00)
	abric he								(33) +	(36) =			108.51	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	27.04	26.75	26.45	24.97	24.68	23.2	23.2	22.9	23.79	24.68	25.27	25.86		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	135.56	135.26	134.97	133.49	133.19	131.71	131.71	131.42	132.3	133.19	133.78	134.37		
			\								Sum(39) ₁ .	12 /12=	133.41	(39)
			HLP), W	ı —						= (39)m ÷				
(40)m=	1.23	1.23	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22	4.04	(40)
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	average =	Sum(40) ₁ .	12 / 12=	1.21	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								I						
4. Wa	iter heat	ing enei	rgy requi	irement:								kWh/ye	ear:	
				irement:									ear:	(10)
Assum	ied occu	ıpancy, İ	N		(-0.0003	349 x (TF	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.		kWh/ye	ear:	(42)
Assum if TF	ed occu A > 13.9	ıpancy, İ	N		(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.			ear:	(42)
Assum if TF if TF Annua	ied occu A > 13.9 A £ 13.9 I averag	ipancy, I 9, N = 1 9, N = 1 e hot wa	N + 1.76 x ater usaç	[1 - exp	es per da	ıy Vd,av	erage =	(25 x N)	+ 36		.9)		ear:	(42)
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average	N + 1.76 x ater usag hot water	[1 - exp ge in litre usage by		ay Vd,av	erage = designed t	(25 x N)	+ 36		.9)	82	ear:	, ,
Assum if TF if TF Annua Reduce	ied occu A > 13.9 A £ 13.9 I averag the annua	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per l	N + 1.76 x ater usag hot water person per	[1 - exp ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,avelwelling is	erage = designed ((25 x N) to achieve	+ 36 a water us	se target o	9) 10°	82	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the o	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36		.9)	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more	ed occu A > 13.9 A £ 13.9 I averag the annua that 125	ipancy, I 9, N = 1 9, N = 1 e hot wa all average litres per p	N + 1.76 x ater usaç hot water person per Mar	[1 - exp ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,ave lwelling is not and co	erage = designed t ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 10°	1.09	ear:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2	par:	, ,
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) 10 ² Nov	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m=	ied occu A > 13.9 A £ 13.9 I averag the annual that 125 Jan er usage in	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per	+ 1.76 x ater usage hot water person per Mar day for ea	[1 - exp ge in litre usage by day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fac 95.03	y Vd,avelling is not and con Jun ctor from 7	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03	+ 36 a water us Sep 99.07	Oct 103.11 Total = Su	9) Nov 107.16 m(44)12 =	1.09 Dec 111.2		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I 9, N = 1 9, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by a day (all w Apr ach month 99.07 culated me	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1	1.09 Dec 111.2 c, 1d) 159.7		(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m=	Ined occurrence of A > 13.9 If A £ 13.9 If average the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of that 125 If average in the annual of the annual of that 125 If average in the annual of the annual	ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy, I ipancy ipan	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83	[1 - exp ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave lwelling is not and co. Jun ctor from T 90.98 190 x Vd,r 107.44	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46)	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Fotal = Su 134.73 Fotal = Su	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ =	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m=	ied occur A > 13.9 A £ 13.9 I average the annual at that 125 Jan 111.2 content of 164.91	ipancy, I ipancy, I	+ 1.76 x ater usag hot water person per Mar day for ea 103.11 used - cal	[1 - exp ge in litre usage by a day (all w Apr ach month 99.07 culated me	es per da 5% if the da sater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,avdwelling is not and co. Jun ctor from 7 90.98	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24	+ 36 a water us Sep 99.07 0 kWh/mon 115.61	Oct 103.11 Total = Su 134.73	Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instant (46)m= Water	ied occur A > 13.9 A £ 13.9 I average the annual that 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage	ppancy, I P, N = 1 P, N = 1 e hot wa al average litres per p Feb n litres per 107.16 hot water 144.23 vater heatin 21.63 loss:	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 and at point 22.32	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4.	y Vd,ave welling is not and co. Jun ctor from 7 90.98 190 x Vd,r 107.44	erage = designed to did) Jul Fable 1c x 90.98 n x nm x E 99.56 enter 0 in 14.93	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	1.09 Dec 111.2 c, 1d) 159.7	1213.1	(43)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storage	ied occur A > 13.9 A £ 13.9 I average the annual enthat 125 Jan arrusage in 111.2 content of 164.91 taneous w 24.74 storage e volum	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per day for ear 103.11 used - cal 148.83 ang at point 22.32 includir	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46	es per da 5% if the of	y Vd,avdwelling is not and co. Jun 90.98 190 x Vd,rd 107.44 r storage), 16.12	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34	Oct 103.11 Total = Su 134.73 Total = Su 20.21	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9	ppancy, I p, N = 1 p, N = 1 e hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored	H + 1.76 x ater usage hot water person per Mar day for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal	ge in litre usage by day (all w Apr ach month 99.07 culated me 129.76 for use (no	es per da 5% if the orater use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68	y Vd,ave welling is not and co. Jun go.98 190 x Vd,r. 107.44 storage), 16.12 /WHRS nter 110	erage = designed to designed t	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Othery Water	ied occur A > 13.9 A £ 13.9 I average the annual of that 125 Jan ar usage in 111.2 content of 164.91 taneous w 24.74 storage e volum munity he wise if no storage	ipancy, I ipancy, I	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ag any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = far 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46) (47)
Assum if TF if TF Annua Reduce not more Hot wate (44)m= Energy (45)m= If instan (46)m= Water Storag If comit Otherv Water a) If m	ined occur in A > 13.9 in A £ 13.9 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 125 in A £ 125 in A £ 125 in A £ 13.9 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in A £ 125 in A £ 13.9 in	ppancy, I P, N = 1 P, N = 1 Pe hot wa al average litres per p 107.16 hot water 144.23 rater heatin 21.63 loss: e (litres) eating a p stored loss: urer's de	H + 1.76 x ater usage hot water person per Mar relay for ear 103.11 used - cal 148.83 ang at point 22.32 includir and no tal hot water water sale includir and tal tal tal tal tal tal tal tal tal tal	ge in litre usage by day (all w Apr ach month 99.07 culated mo 129.76 19.46 ng any so ank in dw er (this in	es per da 5% if the of rater use, I May Vd,m = fac 95.03 onthly = 4. 124.5 o hot water 18.68 olar or W velling, e	y Vd,avdwelling is not and co. Jun go.98 190 x Vd,r. 107.44 r storage), 16.12 /WHRS nter 110 nstantar	erage = designed to do do do do do do do do do do do do do	(25 x N) to achieve Aug (43) 95.03 07m / 3600 114.24 boxes (46) 17.14 within sa (47)	+ 36 a water us Sep 99.07 0 kWh/mor 115.61 17.34 ame vess	Oct 103.11 Total = Su 134.73 Total = Su 20.21 sel	9) Nov 107.16 m(44) ₁₁₂ = ables 1b, 1 147.07 m(45) ₁₁₂ = 22.06	Dec 111.2 c, 1d) 159.7 23.96	1213.1	(43) (44) (45) (46)

Energy lost from water storage, kWh/year	$(48) \times (49) =$	110	(50)
b) If manufacturer's declared cylinder loss factor is not known	1:		I
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3		0.02	(51)
Volume factor from Table 2a		1.03	(52)
Temperature factor from Table 2b		0.6	(53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	1.03	(54)
Enter (50) or (54) in (55)	(11)11(01)11(02)11(00)	1.03	(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$		
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m where	H11) is from Append	l ix H
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.01	30.98 32.01	(57)
		0	(58)
Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 3	365 v (41)m	0	(50)
(modified by factor from Table H5 if there is solar water hea	, ,	ostat)	
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.26	22.51 23.26	(59)
			` '
Combi loss calculated for each month (61)m = (60) \div 365 × (4	i i i		(04)
(61)m= 0 0 0 0 0 0 0	0 0 0	0 0	(61)
Total heat required for water heating calculated for each mon	- 	(46)m + (57)m +	` ′ ′
(62)m= 220.18 194.16 204.11 183.25 179.78 160.93 154.83	3 169.52 169.1 190	200.56 214.98	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	ity) (enter '0' if no solar contribut	tion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)		1
(63)m= 0 0 0 0 0 0	0 0 0	0 0	(63)
Output from water heater			
(64)m= 220.18 194.16 204.11 183.25 179.78 160.93 154.83	3 169.52 169.1 190	200.56 214.98	
	Output from water heate	er (annual) ₁₁₂	2241.41 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45)	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m]
(65)m= 99.05 87.9 93.71 85.94 85.62 78.52 77.32	82.21 81.23 89.02	91.69 97.32	(65)
include (57)m in calculation of (65)m only if cylinder is in the	dwelling or hot water is f	rom community h	eating
5. Internal gains (see Table 5 and 5a):			
Metabolic gains (Table 5), Watts			
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct	Nov Dec	
(66)m= 140.82 140.82 140.82 140.82 140.82 140.82 140.82	 	140.82 140.82	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a),	also see Table 5	!	
(67)m= 24.25 21.53 17.51 13.26 9.91 8.37 9.04	11.75 15.77 20.03	23.38 24.92	(67)
Appliances gains (calculated in Appendix L, equation L13 or L	.13a), also see Table 5		•
(68)m= 271.96 274.78 267.67 252.53 233.42 215.46 203.40	3 200.63 207.75 222.89	242 259.96	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15	a), also see Table 5	•	
(69)m= 37.08 37.08 37.08 37.08 37.08 37.08 37.08	37.08 37.08 37.08	37.08 37.08	(69)
Pumps and fans gains (Table 5a)			l
(70)m= 0 0 0 0 0 0 0	0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)			l
(71)m= -112.66 -112.66 -112.66 -112.66 -112.66 -112.66 -112.6	6 -112.66 -112.66 -112.66	-112.66 -112.66	(71)

Water (72)m=	133.14	1 130.8	125.95	119.36	115.08	10	09.05	103.93	110	.49 112.83	119.6	5 127.35	130.81]	(72
` ′		al gains =		110.00	110.00	T				3)m + (69)m +					(
(73)m=	494.59	, 	476.38	450.39	423.65	3	98.12	381.67	388	· · · · ·	427.8	 	480.94	1	(73
` ′	ar gair		11 0.00	100.00	120.00	1	00.12	001.01	000	101.00	121.0	107.07	100.01		(, ,
			using sola	r flux from	Table 6a	and	l assoc	iated equa	itions	to convert to th	e applic	able orientat	ion.		
Orienta	ation:	Access F	actor	Area			Flu	IX		g_		FF		Gains	
		Table 6d		m²			Tal	ble 6a		Table 6b		Table 6c		(W)	
Northea	ast _{0.9x}	0.54	х	13.	52	X	1	1.28	x	0.24	х	0.7	=	12.46	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	1	1.28	x	0.24	x	0.7	=	3.59	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	1	1.28	x	0.24	x	0.7	=	5.46	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	2	22.97	x	0.24	x	0.7	=	25.35	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	2	22.97	x	0.24	x	0.7	=	7.3	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		22.97	x	0.24	×	0.7	=	11.12	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	4	11.38	x	0.24	x	0.7	_ =	45.68	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	4	11.38	x	0.24	x	0.7	=	13.15	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	4	11.38	x	0.24	x	0.7		20.04	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	6	67.96	x	0.24	x	0.7	=	75.02	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	6	67.96	x	0.24	x	0.7	=	21.6	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	6	67.96	x	0.24	x	0.7		32.91	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	9	91.35	x	0.24	x	0.7	=	100.84	(75
Northea	ast _{0.9x}	0.77	X	2.7	' 3	X	9	91.35	X	0.24	x	0.7	=	29.03	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	9	91.35	x	0.24	x	0.7	=	44.24	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	9	97.38	X	0.24	x	0.7	=	107.5	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	X	9	97.38	X	0.24	x	0.7	=	30.95	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	9	7.38	X	0.24	х	0.7	=	47.17	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X		91.1	X	0.24	x	0.7	=	100.56	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	X		91.1	X	0.24	x	0.7	=	28.96	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X		91.1	x	0.24	x	0.7	=	44.12	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	7	72.63	X	0.24	x	0.7	=	80.17	(75
Northea	ast 0.9x	0.77	X	2.7	' 3	X	7	72.63	X	0.24	x	0.7	=	23.08	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	X	7	72.63	x	0.24	x	0.7	=	35.17	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X	5	50.42	x	0.24	×	0.7	=	55.66	(75
Northea	ast 0.9x	0.77	X	2.7	73	X		50.42	x	0.24	×	0.7	=	16.03	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		50.42	x	0.24	×	0.7	=	24.42	(75
Northea	ast _{0.9x}	0.54	X	13.	52	X		28.07	x	0.24	×	0.7	=	30.98	(75
Northea	ast _{0.9x}	0.77	X	2.7	73	x		28.07	x	0.24	x	0.7	=	8.92	(75
Northea	ast _{0.9x}	0.77	X	4.1	6	x		28.07	x	0.24	×	0.7	=	13.59	(75
Northea	ast _{0.9x}	0.54	X	13.	52	x		14.2	x	0.24	×	0.7	=	15.67	(75
Northea	ast 0.9x	0.77	x	2.7	73	x		14.2	х	0.24	×	0.7		4.51	(75

		_					7		_ ,				
Northeast _{0.9x}	0.77	X	4.16		x	14.2	X	0.24	×	0.7	=	6.88	(75)
Northeast _{0.9x}	0.54	X	13.52		х	9.21	X	0.24	x	0.7	=	10.17	(75)
Northeast _{0.9x}	0.77	X	2.73		х	9.21	X	0.24	X	0.7	=	2.93	(75)
Northeast _{0.9x}	0.77	X	4.16		х	9.21	X	0.24	X	0.7	=	4.46	(75)
Southwest _{0.9x}	0.77	X	7.54		х	36.79		0.24	x	0.7	=	32.3	(79)
Southwest _{0.9x}	0.77	X	7.54		х	62.67]	0.24	Х	0.7	=	55.02	(79)
Southwest _{0.9x}	0.77	X	7.54		х	85.75]	0.24	X	0.7	=	75.28	(79)
Southwest _{0.9x}	0.77	X	7.54		x	106.25		0.24	x	0.7	=	93.27	(79)
Southwest _{0.9x}	0.77	X	7.54		x	119.01		0.24	x	0.7	=	104.47	(79)
Southwest _{0.9x}	0.77	X	7.54		x	118.15		0.24	x	0.7	=	103.72	(79)
Southwest _{0.9x}	0.77	X	7.54		x	113.91	Ī	0.24	x	0.7		99.99	(79)
Southwest _{0.9x}	0.77	x	7.54		x	104.39	Ī	0.24	x	0.7		91.64	(79)
Southwest _{0.9x}	0.77	x	7.54		х 🔚	92.85	Ī	0.24	x	0.7	=	81.51	(79)
Southwest _{0.9x}	0.77	x	7.54		х 🔚	69.27	Ī	0.24	x	0.7		60.81	(79)
Southwest _{0.9x}	0.77	x	7.54		x	44.07	ĺ	0.24	x	0.7		38.69	(79)
Southwest _{0.9x}	0.77	x	7.54		x 🔚	31.49	Ī	0.24	x	0.7		27.64	(79)
Northwest _{0.9x}	0.77	X	3.51		x	11.28	X	0.24	×	0.7		4.61	(81)
Northwest _{0.9x}	0.77	x	3.51		x	22.97	X	0.24	x	0.7		9.39	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🗀	41.38	j×	0.24	x	0.7		16.91	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	67.96	X	0.24	×	0.7	=	27.77	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	91.35	X	0.24	x	0.7	=	37.33	(81)
Northwest 0.9x	0.77	×	3.51		x 🗀	97.38	X	0.24	x	0.7		39.8	(81)
Northwest _{0.9x}	0.77	×	3.51		x 🔚	91.1	X	0.24	x	0.7	=	37.23	(81)
Northwest 0.9x	0.77	x	3.51		x 🗀	72.63	X	0.24	x	0.7		29.68	(81)
Northwest 0.9x	0.77	×	3.51		x 🗀	50.42	X	0.24	- x	0.7		20.6	(81)
Northwest 0.9x	0.77	x	3.51		x 🗀	28.07	X	0.24	x	0.7		11.47	(81)
Northwest _{0.9x}	0.77	×	3.51	\equiv	x 🔚	14.2	X	0.24	- x	0.7		5.8	(81)
Northwest _{0.9x}	0.77	X	3.51	\equiv	x 🔚	9.21	X	0.24	x	0.7	╡ .	3.77	(81)
L	-				<u> </u>		_	-					` ′
Solar gains in	watts, calc	ulated	for each r	nonth			(83)m	n = Sum(74)m	(82)m				
(83)m= 58.42		71.06		15.91	329.13	310.86	259	.75 198.22	125.77	71.55	48.97		(83)
Total gains – i	nternal and	d solar	$(84)m = (7)^{-1}$	73)m -	+ (83)n	n , watts		'		•		_	
(84)m= 553	600.54 6	647.44	700.96 7	39.56	727.25	692.54	647	.87 599.81	553.58	529.52	529.9		(84)
7. Mean inter	nal temper	rature (heating se	eason')								
Temperature		`				a from Ta	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	tor for gair	ns for li	ving area,	h1,m	(see 1	able 9a)							
Jan	Feb	Mar	Apr	May	Jun		Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	1	1	0.99	0.96	0.88	0.75	0.	8 0.95	0.99	1	1		(86)
Mean interna	l temperati	ure in li	iving area	T1 (fc	llow st	ens 3 to	7 in T	able 9c)				_	
(87)m= 19.56		19.9		20.56	20.83	-i	20.		20.3	19.88	19.55	1	(87)
	<u> </u>								1		<u> </u>	_	
Temperature (88)m= 19.9	_ <u> </u>	19.9		19.91	19.92	-	19.		19.91	19.91	19.91	7	(88)
(00)111-	1 10.0	10.0	10.01		10.02	10.02	1 19.	13.32	10.91	1 10.91	10.01	J	(30)

Utilisa	ation fac	tor for a	ains for i	rest of d	wellina. I	n2.m (se	ee Table	9a)						
(89)m=	1	1	1	0.99	0.95	0.81	0.61	0.67	0.91	0.99	1	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	le 9c)				
(90)m=	17.98	18.14	18.47	18.95	19.43	19.79	19.9	19.89	19.65	19.06	18.45	17.96		(90)
									1	fLA = Livin	g area ÷ (4	1) =	0.14	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = fl	LA × T1	+ (1 – fL	.A) × T2			<u> </u>		_
(92)m=	18.2	18.36	18.67	19.13	19.59	19.94	20.05	20.04	19.8	19.23	18.65	18.18		(92)
Apply	adjustn	nent to th	ne mean	internal	tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.2	18.36	18.67	19.13	19.59	19.94	20.05	20.04	19.8	19.23	18.65	18.18		(93)
8. Sp	ace hea	ting requ	uirement											
		mean int factor fo				ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
tile di	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa		tor for g		<u> </u>										
(94)m=	1	1	0.99	0.98	0.94	0.82	0.62	0.69	0.91	0.98	1	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m=	551.87	598.52	642.85	687.01	693.46	592.99	432.47	443.82	545.07	545.07	527.51	529.03		(95)
	<u> </u>	_			from Ta			<u> </u>	ı					(22)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
					1050.37		=[(39)m : 454.31	x [(93)m 477.83	- (96)m 753.68	1149.8	1545.14	1878.77		(97)
							th = 0.02	l				1070.77		(91)
(98)m=	991.29	820.95	743.73	488.54	265.54	0	0.02	0	0	449.92	732.69	1004.21		
` '							<u> </u>	<u> </u>	l I per year	l(kWh/year	<u> </u>	8) _{15,912} =	5496.88	(98)
Spac	e heatin	g require	ement in	kWh/m²	/year						,		49.84]] [99)
		• .			heating	scheme								J` ′
					The state of the s		ater heat	tina prov	ided by	a comm	unitv sch	neme.		
		-				-	neating (• .	-		,		0	(301)
Fractio	n of spa	ce heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme may	/ obtain he	eat from se	everal sour	ces. The p	orocedure	allows for	CHP and	up to four	other heat	sources; tl	he latter	-
			-		aste heat f	rom powe	r stations.	See Appe	ndix C.			i	0.40	7(2025)
		at from C			•								0.13	(303a)
		nmunity										ļ	0.87	(303b)
		·			nunity Cl					(3	02) x (303	a) =	0.13	(304a)
Fraction	n of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	communi	ty heatii	ng syste	m					1.05	(306)
Space	heating	9											kWh/year	_
Annua	l space	heating	requirem	nent									5496.88	
Space	heat fro	m Comr	nunity C	HP					(98) x (30	04a) x (30	5) x (306) =	=	750.32	(307a)
												-		

Space heat from heat source 2		(98) x (304b) x	(305) x (306) =	5021.4	(307b)
Efficiency of secondary/supplement	tary heating system in % (from Table 4a or Apper	ndix E)	0	(308
Space heating requirement from se	econdary/supplementary sy	/stem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2241.41	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x	(305) x (306) =	305.95	(310a)
Water heat from heat source 2		(64) x (303b) x	(305) x (306) =	2047.53	(310b)
Electricity used for heat distribution	ı	0.01 × [(307a)(307	'e) + (310a)(310e)] =	81.25	(313)
Cooling System Energy Efficiency I	Ratio		0	(314)	
Space cooling (if there is a fixed co	ooling system, if not enter 0	= (107) ÷ (314)	0	(315)	
Electricity for pumps and fans within mechanical ventilation - balanced, or		m outside		253.98	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (330	b) + (330g) =	253.98	(331)
Energy for lighting (calculated in Ap	opendix L)			428.18	(332)
Electricity generated by PVs (Appe	ndix M) (negative quantity))		-235.75	(333)
Electricity generated by wind turbin	e (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions – Community	heating scheme				
12b. CO2 Emissions – Community Electrical efficiency of CHP unit	heating scheme			30.6	(361)
·	heating scheme			30.6	(361)
Electrical efficiency of CHP unit	heating scheme	Energy	Emission factor	63	_
Electrical efficiency of CHP unit	heating scheme	Energy kWh/year	Emission factor kg CO2/kWh	63	_
Electrical efficiency of CHP unit	heating scheme (307a) × 100 ÷ (362) =			63 Emissions	_
Electrical efficiency of CHP unit Heat efficiency of CHP unit	J	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year 257.25	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year 1190.99 × 364.44 ×	0.22 0.52	63 Emissions kg CO2/year 257.25 -189.15	(362) (363) (364)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 1190.99 × 364.44 × 485.64 ×	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13	(362) (363) (364) (365)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 1190.99 X 364.44 X 485.64 X 148.61 X	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7	(362) (363) (364) (365) (366)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99	(362) (363) (364) (365) (366) (367b)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17	(362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In this systems	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use the content of the	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the contact of the con	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im-	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the contact of the con	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 (366) for the second fue 0.22 0.52 = 0.52 = 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04 0 1717.04	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the contact of the con	kWh/year 1190.99	kg CO2/kWh 0.22 0.52 0.52 0.52 (366) for the second fue 0.22 0.52 0.52 0.52 = 0.52 = 0.52	63 Emissions kg CO2/year 257.25 -189.15 104.9 -77.13 96.7 1578.99 42.17 1717.04 0 1717.04 131.81	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)

Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) -122.35 0.52 sum of (376)...(382) = Total CO2, kg/year (383) 1948.73 $(383) \div (4) =$ **Dwelling CO2 Emission Rate** 17.67 (384) El rating (section 14) (385)83.18

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.10	
	F	Property	Address	: Flat 1-	1-Green				
Address: 1. Overall dwelling dime	pnoiono:								
1. Overall dwelling diffie	#1151U115.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Basement				(1a) x		2.6	(2a) =	192.56	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) -	74.06	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.56	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	- + -	0	Ī = Ī	0	x2	20 =	0	(6b)
Number of intermittent fa	ins				0	x '	10 =	0	(7a)
Number of passive vents	3			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_					
		_	. _ \	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(/ , ,	00		o (o) to	(1.5)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	1.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	ter wall are	a (aner					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	vise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (*	19)] =			0.85	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
- 	• •	•	-	-	-	-	-	•	

Adjusted infiltra	ation rate ((allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.16		0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effect		-	rate for t	he appli	cable ca	se			•			<u>-</u>	
If mechanica			andiv NL (O	ah) (aa	a) Franc (a	augtion (I	NEV otho	muiaa (22h	\ (225\			0.5	(23a
If exhaust air he) = (23a)			0.5	(23b
If balanced with			-	_					21.)		4 (00.)	76.5	(230
a) If balance						- ` ` 	- ^ ` ` 	i `	 		- ` ` `) ÷ 100] 1	(246
(24a)m= 0.28		0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(24a
b) If balance						 	- ^ ` ` - 	ŕ	r Ó		<u> </u>	1	(0.41)
(24b)m= 0	0	0	0	0		0	0	0	0	0	0]	(24b
c) If whole he				•	•				E v (22h	.\			
(24c)m = 0	$0.5 \times (2)$	0	0	0 = (231)	0	0	$\frac{C}{C} = (22)$	0	0	0	0	1	(240
` ',										0		J	(2.0
d) If natural v if (22b)m	n = 1, then				•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(240
Effective air	change ra	te - er	iter (24a	or (24k	o) or (24	c) or (24	d) in bo	x (25)	ļ.		!	1	
(25)m= 0.28	 _	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	1	(25)
					ı	l	ı	ı	l		ı	1	
3. Heat losses		loss p			NIat Au		Himal		A V I I		l l	_	A V I-
ELEMENT	Gross area (m	∩²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-valu kJ/m²·		A X k kJ/K
Doors	,	,			2.6	x	1.2		3.12	<u></u>			(26)
Windows Type	: 1				3.26		/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type					3.95	〓 .	/[1/(1.2)+		4.52				(27)
Windows Type					5.51	_	/[1/(1.2)+		6.31	=			(27)
Windows Type					0.65	_	/[1/(1.2)+		0.74				(27)
Floor	· ¬					=		;		ᆿ ,			(28)
		_			14.69	=		ᆗ ゙!	1.6159	-			 `
Walls Type1	67.78	4	20.5	3	47.2	=	0.15	_ = !	7.08	ᆜ !		_	(29)
Walls Type2	24.47	닠	2.6		21.87	7 X	0.15	=	3.28	닠 !		_	(29)
Walls Type3	5.93		0		5.93	X	0.15	=	0.89				(29)
Total area of e	lements, n	n²			112.8	7							(31)
Party wall					12.38	3 X	0	=	0				(32)
Party floor					59.37	7							(32a
Party ceiling					74.06	5							(32)
* for windows and ** include the area						ated using	g formula 1	/[(1/U-valu	ıе)+0.04] а	s given in	paragrapi	h 3.2	
Fabric heat los	s, W/K = 5	S (A x	U)				(26)(30) + (32) =				39.55	(33)
Heat capacity (Cm = S(A	xk)						((28).	(30) + (32	2) + (32a).	(32e) =	27754.	95 (34)
Thermal mass	paramete	r (TMF	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
For design assess can be used instead				construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge				ısina Ar	pendix I	<						18.19	(36)
omai briage	(L X	. , oan	caiaica (, , , , , , , , , , , , , , , , , , ,	י אוטוייטקי	•						10.18	,(30)

if details o			are not kn	own (36) =	= 0.15 x (3	1)						·		_
Total fal									` '	(36) =			57.74	(37)
Ventilati	т								` ′	·	(25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat tra	nsfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	75.53	75.33	75.13	74.12	73.91	72.9	72.9	72.7	73.31	73.91	74.32	74.72		_
Heat los	ss parar	meter (H	ILP), W/	′m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	74.07	(39)
(40)m=	1.02	1.02	1.01	1	1	0.98	0.98	0.98	0.99	1	1	1.01		
	•									Average =	Sum(40) ₁	12 /12=	1	(40)
Number	of days	s in mor	nth (Tabl	le 1a)		ı				ı		1		
_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wate	er heati	ng ener	gy requi	rement:								kWh/ye	ear:	
_														
Assume				[1 ovn	(0 0003	240 v (TE	FA -13.9	\2\1 + O (1012 v (TEA 12		.34		(42)
	۱۵.9 ۱£ 13.9		+ 1.76 X	[ı - exp	(-0.0003	949 X (11	-A -13.9)2)] + 0.0) X C I U	IFA -13.	.9)			
Annual a		•	iter usac	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.79		(43)
Reduce th	ne annual	average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		0		(- /
not more t	that 125 l	litres per p	person per	day (all w	ater use, l	hot and co	ld)					_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Energy co	ontent of I	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.45	(44)
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
		!				Į.			_	rotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instanta	neous wa	ater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)			'		
(46)m=	21.97	19.22	19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Water st	-					•		•				•		
Storage	volume	e (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comm	•	_			-			' '						
Otherwis			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water st	•		الممسما	ft-		(14) (1/4)	- /-l : \ .							(10)
,				oss facto	or is kno	wn (Kvvr	i/day):					0		(48)
Tempera												0		(49)
Energy I			•	-				(48) x (49)) =		1	10		(50)
Hot wate				cylinder l								02		(51)
If comm		_			- (v)	., 0, 00	7)					.02		(01)
Volume	-	_		-							1.	.03		(52)
Tempera				2b								.6		(53)
Energy I	lost fror	n water	storage	, kWh/ve	ear			(47) x (51)	x (52) x (53) =		.03		(54)
9, '				, , y .				. ,				VV.		()
Enter (5	50) or (5	54) in (5	55)						, , ,			.03		(55)

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-			
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	i –	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	ETable 5 5), Wat Mar 117.03	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if constant of the consta	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m s and 5a ts Apr 117.03 ppendix 10.07 Append	only if constant of the consta	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in Ap 14.7 (Table 5 0 n (negation 5)	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 Dee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

		<u>_</u>													
Southwest _{0.9}	<u> </u>	X	0.6	S5	X	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	X	9	2.85			0.24	X	0.7	=	59.56	(79)
Southwest _{0.9}	x 0.77	X	0.6	S5	X	9	2.85]		0.24	x	0.7	=	7.03	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	x	6	9.27]		0.24	×	0.7	_	44.43	(79)
Southwest _{0.9}	× 0.77	X	0.6	S5	x	69.27]		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7	=	28.27	(79)
Southwest _{0.9}	× 0.77	X	0.6	65	x	4	4.07]		0.24	x	0.7	=	3.34	(79)
Southwest _{0.9}	× 0.77	X	5.5	51	x	3	1.49]		0.24	x	0.7		20.2	(79)
Southwest _{0.9}	× 0.77	X	0.6	S5	x	3	1.49			0.24	x	0.7		2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	n = Si	um(74)m .	(82)m			_	
(83)m= 45.3	3 83.51	130.97	190.29	238.71	24	48.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains -	- internal a	and solar	r (84)m =	= (73)m ·	+ (8	33)m	, watts							_	
(84)m= 453.3	489.52	524.22	562.95	590.51	57	79.86	553.11	521	.02	485.99	452.34	434.89	435.38	<u>;</u>	(84)
7. Mean int	ernal tem	perature	(heating	season)										
Temperatu	re during l	neating p	eriods ir	n the livi	ng :	area 1	from Tal	ole 9,	, Th	1 (°C)				21	(85)
Utilisation f	actor for o	ains for	living are	ea, h1,m	(Se	ee Ta	ble 9a)			` ,					
Jar		Mar	Apr	May	È	Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.97	0.91	(0.75	0.57	0.6	62	0.87	0.98	1	1	7	(86)
Mean inter	nal temne	rature in	living ar	ea T1 (fo	مااد	w ste	ns 3 to 7	7 in T	ahle	2 9c)				_	
(87)m= 19.9		20.26	20.54	20.8	_	0.96	20.99	20.		20.89	20.57	20.22	19.93	٦	(87)
` '		ı	<u> </u>	<u> </u>			l	I				1 -		_	` '
Temperatu (88)m= 20.0	-	20.07	20.08	20.08	_	eiiing 20.1	20.1	20.	$\overline{}$	12 (°C) 20.09	20.08	20.08	20.08	٦	(88)
(88)m= 20.0°	20.07	20.07	20.06	20.06		20.1	20.1	20.	.'	20.09	20.06	20.06	20.06		(00)
Utilisation f		1	1	welling,	_	·	r	9a)						_	
(89)m= 1	0.99	0.99	0.96	0.87	(0.66	0.46	0.5	51	0.8	0.97	0.99	1		(89)
Mean inter	nal tempe	rature in	the rest	of dwelli	ing	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c)				
(90)m= 18.6	6 18.82	19.12	19.53	19.88	2	0.06	20.09	20.	09	20	19.58	19.06	18.64		(90)
										f	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inter	nal tempe	rature (fo	r the wh	ole dwe	lline	a) = fl	LA × T1	+ (1	– fL	A) × T2					_
(92)m= 19	19.15	19.42	19.8	20.12	1	20.3	20.33	20.		20.23	19.84	19.37	18.98	7	(92)
Apply adjus	stment to t	he mear	interna	l temper	atu	re fro	m Table	4e,	whe	re appro	priate	<u> </u>	!	_	
(93)m= 19	19.15	19.42	19.8	20.12	2	20.3	20.33	20.	33	20.23	19.84	19.37	18.98	7	(93)
8. Space h	eating req	uirement			•										
Set Ti to th			•		ned	at ste	ep 11 of	Tabl	le 9b	o, so tha	t Ti,m=	:(76)m an	d re-ca	lculate	
the utilisation				1	_		Ι					1	ı	_	
Jar		Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
Utilisation f	 											1		¬	(0.4)
(94)m= 1	0.99	0.98	0.96	0.87		0.68	0.49	0.5	04	0.82	0.96	0.99	1		(94)
Useful gair (95)m= 451.4	1	$\frac{1}{516.24}$	4)m x (8/ 538.32	4)m 514.26	20	95.73	269.42	281	12	396.19	436.36	431.29	433.93	\neg	(95)
		l			<u> </u>		209.42	201	1.3	390.19	430.30	431.29	433.93	'_	(93)
Monthly av (96)m= 4.3	erage exte	6.5	8.9	11.7	_	e 8 14.6	16.6	16.	₄ 1	14.1	10.6	7.1	4.2	٦	(96)
Heat loss r							<u> </u>					1 '.1	J 7.2	_	(50)
	28 1073.13		807.72	622.56	_	, vv =	271.85	285		- (96)III 449.57	J 683.17	911.67	1104.4	8	(97)
(07)111- [1110.	-5 1075.15	1 070.00	1 001.12	022.00		. 0.72	2, 1.00	1 200	.02	770.01	505.17	1 311.07	I 104.4	<u> </u>	(3.)

Space	heating	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m=	490.17	394.49	337.86	193.97	80.58	0	0	0	0	183.63	345.87	498.89		
_				•				Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2525.45	(98)
Space	heating	g require	ement in	kWh/m²	/year							Ī	34.1	(99)
8c. Sp	ace co	oling rec	quiremer	nt										
Calcu	ated fo	r June,	July and	August.	See Tal	ble 10b								
L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г		<u> </u>	l			·		and exte	ı	r i	i e	r i		(400)
(100)m=	0	0	0	0	0	685.27	539.47	552.51	0	0	0	0		(100)
г	tion fac	tor for lo	oss nm	0	0	0.00	0.94	0.02	0	0	0	0		(101)
(101)m=				(100)m x		0.89	0.94	0.93	0	0	0	0		(101)
(102)m=	0	0	0	0	0	608.06	508.87	511.09	0	0	0	0		(102)
L								ee Table						, ,
(103)m=	0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
•	-			r month, : 3 × (98		dwelling,	continu	ous (kW	h = 0.0)24 x [(10	03)m – (102)m] x	: (41)m	
(104)m=	0	0	0	0	0	103.63	156.51	127.74	0	0	0	0		
-						•	•		Tota	l = Sum(104)	= [387.89	(104)
Cooled									f C =	cooled	area ÷ (4	4) = [0.6	(105)
г			able 10b	 		0.05	0.05	0.05						
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tata	0	(104)	0		7(400)
Space	coolina	reauirer	nent for	month =	: (104)m	× (105)	× (106)r	m	TOla	I = Sum(1 <u>U4</u>)	= [0	(106)
(107)m=	0	0	0	0	0	15.57	23.51	19.19	0	0	0	0		
_						•	•	•	Tota	l = Sum(107)	=	58.27	(107)
Space	cooling	requirer	ment in k	«Wh/m²/y	/ear				(107) ÷ (4) =		Ī	0.79	(108)
9b. Ene	ergy rec	luiremer	nts – Cor	mmunity	heating	scheme)							
								ting prov			unity sch	neme.		_
Fraction	n of spa	ce heat	from se	condary,	/supplen	nentary l	heating	(Table 1	1) '0' if n	one		Ĺ	0	(301)
Fraction	n of spa	ce heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	•					•		allows for See Appe		up to four	other heat	sources; th	e latter	
			Commun		ioto moat i	rom power	oldiono.	000 7 ippor	raix o.			Γ	0.13	(303a)
Fraction	n of con	nmunity	heat fro	m heat s	ource 2							Ī	0.87	(303b)
Fraction	n of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fraction	n of tota	al space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem		Ī	1	(305)
Distribu	ıtion los	s factor	(Table 1	12c) for c	commun	ity heati	ng syste	m				Ī	1.05	(306)
Space	heating	9										L	kWh/yea	 r
-		-	requiren	nent									2525.45	
Space	heat fro	m Comr	munity C	HP					(98) x (3	04a) x (30	5) x (306) :	= [344.72	(307a)

Shace heat from heat collice 2		(00) (00 41-) -	(005) (000)		7(0071)
Space heat from heat source 2			((305) x (306) =	2307	(307b)
Efficiency of secondary/supplement		• •	,	0	(308
Space heating requirement from se	condary/supplementary sy	/stem (98) x (301) x	100 ÷ (308) =	0	(309)
Water heating					7
Annual water heating requirement If DHW from community scheme:				2063.55	╛
Water heat from Community CHP		(64) x (303a) >	(305) x (306) =	281.67	(310a)
Water heat from heat source 2		(64) x (303b) >	(305) x (306) =	1885.05	(310b)
Electricity used for heat distribution		0.01 × [(307a)(30	7e) + (310a)(310e)] =	48.18	(313)
Cooling System Energy Efficiency F	Ratio			4.73	(314)
Space cooling (if there is a fixed coo	oling system, if not enter 0	= (107) ÷ (314) =	12.33	(315)
Electricity for pumps and fans within mechanical ventilation - balanced, e	O \ ,	m outside		158.57	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/	year	=(330a) + (330	0b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Ap	pendix L)			325.25	(332)
Electricity generated by PVs (Apper	ndix M) (negative quantity))		-158.19	(333)
Electricity generated by wind turbine	e (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy	Emission factor		
Change heating from CLID)	(307a) × 100 ÷ (362) =	kWh/year	kg CO2/kWh	kg CO2/year	
Space heating from CHP)		547.18 X	0.22		7,,,,,
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$			118.19	(363)
W () () OUD	(240-) 400 (200)	167.44 ×	0.52	-86.9	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	447.1 ×	0.52		(364)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	447.1 ×	0.22	-86.9 96.57 -71.01	(364) (365) (366)
less credit emissions for electricity Efficiency of heat source 2 (%)	$-(310a) \times (361) \div (362) =$	447.1 X	0.22	-86.9 96.57 -71.01	(364)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$ If there is CHP us	447.1 ×	0.22 0.52 0 (366) for the second fue	-86.9 96.57 -71.01	(364) (365) (366)
less credit emissions for electricity Efficiency of heat source 2 (%)	$-(310a) \times (361) \div (362) =$ If there is CHP us [(307b)	447.1 × 136.81 × sing two fuels repeat (363) to	0.22 0.52 0 (366) for the second fue 0.22	-86.9 96.57 -71.01	(364) (365) (366) (367b)
less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	-(310a) x (361) ÷ (362) = If there is CHP us [(307th	447.1 x 136.81 x sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	0.22 0.52 0 (366) for the second fue 0.22 0.52	-86.9 96.57 -71.01 el 96.7 = 936.38	(364) (365) (366) (367b) (368)
less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distributio	-(310a) x (361) ÷ (362) = If there is CHP us [(307th	447.1 x 136.81 x sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x	0.22 0.52 0 (366) for the second fue 0.22 0.52	-86.9 96.57 -71.01 el 96.7 = 936.38 = 25.01	(364) (365) (366) (367b) (368) (372)
less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distributio Total CO2 associated with commun	-(310a) × (361) ÷ (362) = If there is CHP us [(307th n) ity systems (secondary)	447.1 x 136.81 x 136.81 x sing two fuels repeat (363) to co)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) x	0.22 0.52 0 (366) for the second fue 0.22 0.52	-86.9 96.57 -71.01 el 96.7 = 936.38 = 25.01 = 1018.25	(364) (365) (366) (367b) (368) (372) (373)
less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distributio Total CO2 associated with commun CO2 associated with space heating	-(310a) × (361) ÷ (362) = If there is CHP us [(307th n) ity systems (secondary) mersion heater or instanta	447.1 x 136.81 x 136.81 x sing two fuels repeat (363) to co)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) x	0.22 0.52 0.366) for the second fue 0.22 0.52 0.52	-86.9 96.57 -71.01 el 96.7 = 936.38 = 25.01 = 1018.25 = 0	(364) (365) (366) (367b) (368) (372) (373) (374)
less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distributio Total CO2 associated with commun CO2 associated with space heating CO2 associated with water from imi	-(310a) × (361) ÷ (362) = If there is CHP us [(307th n) ity systems (secondary) mersion heater or instanta	447.1 x 136.81 x 136.81 x sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x Ineous heater (312) x	0.22 0.52 0.366) for the second fue 0.22 0.52 0.52	-86.9 96.57 -71.01 el 96.7 = 936.38 = 25.01 = 1018.25 = 0	(364) (365) (366) (367b) (368) (372) (373) (374) (375)

CO2 associated with electricity for lighting (332))) x 168.8 (379)0.52 Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) 0.52 -82.1 Total CO2, kg/year sum of (376)...(382) = (383) 1193.65 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ (384)16.12 El rating (section 14) (385)86.57

		l Isar I	Details:									
Assessor Name:	Chris Hocknell	— 036 1-1	Strom	a Num	ber:		STRO	O016363				
Software Name:	Stroma FSAP 2012		Softwa			on: 1.0.4.10						
	F	Property	Address	Flat 1-2	2-Green							
Address: 1. Overall dwelling dimer	noiono:											
1. Overall dwelling diffie	NSIONS.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)			
Basement				(1a) x		2.6	(2a) =	197.76	(3a)			
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) :	76.06	(4)			.					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)			
2. Ventilation rate:												
2. Vertilation rate.	main seconda heating heating	ry	other		total			m³ per hou	ır			
Number of chimneys		- + [0] = [0	X 4	40 =	0	(6a)			
Number of open flues	0 + 0		0	j = [0	x	20 =	0	(6b)			
Number of intermittent far	ns			, <u> </u>	0	x .	10 =	0	(7a)			
Number of passive vents				Ē	0	x .	10 =	0	(7b)			
Number of flueless gas fir	res			F	0	x	40 =	0	(7c)			
				L					_			
Air changes per hour												
•	vs, flues and fans = $(6a)+(6b)+(6b)+(6b)$			continue fr	0		÷ (5) =	0	(8)			
Number of storeys in th		id 10 (17),	ourier wise t	onunae n	om (9) to	(10)		0	(9)			
Additional infiltration						[(9)	-1]x0.1 =	0	(10)			
	25 for steel or timber frame o			•	ruction			0	(11)			
if both types of wall are producting areas of opening	esent, use the value corresponding t gs); if equal user 0.35	o tne grea	ter wall are	a (atter								
•	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)			
If no draught lobby, ent	•							0	(13)			
Window infiltration	and doors draught stripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)			
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(16)			
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)			
•	ty value, then $(18) = [(17) \div 20] + (18)$							0.15	(18)			
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed	ĺ	_	7(10)			
Number of sides sheltered Shelter factor	u		(20) = 1 -	[0.0 75 x (1	19)] =			0.78	(19) (20)			
Infiltration rate incorporati	ing shelter factor		(21) = (18) x (20) =				0.12	(21)			
Infiltration rate modified for	or monthly wind speed								_			
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Monthly average wind spe	eed from Table 7				•			1				
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7					
Wind Factor (22a)m = (22	?)m ÷ 4											
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18					

Adjusted infiltration rate (allowing for	or shelter ar	nd wind s	peed) =	(21a) x	(22a)m					
0.15 0.15 0.14 0.1	3 0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective air change rate f	for the appl	icable ca	se	•	•	•	•	•	•	
If mechanical ventilation: If exhaust air heat pump using Appendix I	N (22h) - (22	a) + Emy (a	auation (N	VEVV otho	ruina (22h	v)			0.5	(23a)
If balanced with heat recovery: efficiency)) = (23a)			0.5	(23b)
	_					Ob) /	00k\ f	4 (00-)	76.5	(23c)
a) If balanced mechanical ventila: (24a)m= 0.27 0.26 0.26 0.2		0.23	0.23	HR) (248 0.23	a)m = (2) 0.23	2b)m + (0.24	23D) × [0.25	1 – (23c) 0.25	÷ 100] 	(24a)
` '		لــــــــــــــــــــــــــــــــــــــ			ļ			0.25		(240)
b) If balanced mechanical ventila (24b)m= 0 0 0 0		1 1	overy (i		$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	r ´ `				(24b)
` '	ļ	0		0		0	0	0		(240)
c) If whole house extract ventilation if (22b)m < 0.5 × (23b), then	•	•				.5 × (23b	o)			
(24c)m= 0 0 0 0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation or whole h if (22b)m = 1, then (24d)m =		•				0.5]	•		•	
(24d)m= 0 0 0 0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate - enter (24a) or (24	b) or (240	c) or (24	d) in box	x (25)				•	
(25)m= 0.27 0.26 0.26 0.2	.5 0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losses and heat loss parar		, ,								
	enings m²	Net Are A ,n		U-valı W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
Doors		2.6	x	1.2	=	3.12	,			(26)
Windows Type 1		3.26	x1.	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type 2		3.95	x1.	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type 3		5.51	x1.	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type 4		0.65		/[1/(1.2)+	0.04] =	0.74	=			(27)
Floor		14.36	=	0.11		1.5796			\neg	(28)
Walls Type1 38.14	20.58	17.56	=	0.15		2.63	=		╡┝	(29)
Walls Type2 23.92	2.6	21.32	=	0.15		3.2	북 ¦		╡	(29)
Walls Type3 5.95	0	5.95	x		=		-		╡	(29)
W " + 1 -	===		=	0.15	=	0.89	 		╡╠	
Total area of elements, m ²	0	29.51	=	0.15	=	4.43				(29)
		111.88	=							(31)
Party wall		12.35	X	0	=	0			╡	(32)
Party floor		61.7	_						╛╠	(32a)
Party ceiling		76.06					. [(32b)
* for windows and roof windows, use effectiv ** include the areas on both sides of internal			ated using	g tormula 1	/[(1/U-valu	ue)+0.04] á	as given in	paragraph	3.2	
Fabric heat loss, $W/K = S(A \times U)$	and pur									
				(26)(30)) + (32) =				39.42	(33)
Heat capacity Cm = S(A x k)				(26)(30)		(30) + (32	2) + (32a).	(32e) =	39.42 27990.6	(33)
, ,	cm ÷ TFA) i	n kJ/m²K		(26)(30)	((28).	(30) + (32 ative Value	, , ,	(32e) =		

can be u	ısed instea	ad of a de	tailed calc	ulation.										
Therma	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix I	<						18.24	(36)
if details	of therma	l bridging	are not kn	own (36) =	= 0.15 x (3	1)								 `
Total fa	abric hea	at loss							(33) +	(36) =			57.66	(37)
Ventila	tion hea	t loss ca	alculated	monthl	у			-	(38)m	= 0.33 × ((25)m x (5))	_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat tr	ansfer c	oefficier	nt, W/K		-	-	-		(39)m	= (37) + (38)m		_	
(39)m=	75	74.81	74.62	73.67	73.48	72.53	72.53	72.34	72.91	73.48	73.86	74.24		_
Heat lo	ss para	meter (H	HLP), W/	′m²K				_		Average = = (39)m ÷	Sum(39)₁ - (4)	12 /12=	73.62	(39)
(40)m=	0.99	0.98	0.98	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.97	0.98		
Numbe	er of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.97	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ing ener	rgy requi	rement:								kWh/y	ear:	
if TF.	ed occu A > 13.9 A £ 13.9	0, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		.38]	(42)
Annual Reduce	averag	e hot wa Il average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target c).82]	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Hot wate					Vd,m = fa				004				J	
(44)m=	99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9]	
ı	<u> </u>		l .		!	!	<u>!</u>	!			m(44) ₁₁₂ =		1089.8	(44)
Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600	kWh/mon	nth (see Ta	ables 1b, 1	c, 1d)	_	
(45)m=	148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
If inctant	la na a u a uu	ator booti	na ot noint	of upo /pr	hat water	r 040 ro mo l	ontor O in	haves (46		Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
ı								boxes (46)					1	(40)
(46)m= Water	22.22 storage	19.44 loss:	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52]	(46)
	_		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0]	(47)
•		` ,			/elling, e		_						1	, ,
Otherw	ise if no	stored	hot wate	er (this in	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
	storage												-	
•					or is kno	wn (kWł	n/day):					0	<u> </u>	(48)
•			m Table									0	Ţ	(49)
			storage	-		or io pot	knows:	(48) x (49)	=		1	10]	(50)
Hot wa	ter stora	age loss		om Tabl	loss fact le 2 (kW						0.	.02]	(51)
	e factor	-		JII 7.J							1	.03	1	(52)
			m Table	2b							_).6	1	(53)
													-	

Energy lost from water storage, kWh/year	(47) x (51) x (52)) x (53) =	1.00	3		(54)
Enter (50) or (54) in (55)		L	1.03	3		(55)
Water storage loss calculated for each month	$((56)m = (55) \times ($	(41)m				
	32.01 32.01 30.9		30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H1	[11)] ÷ (50), else (57)m =	(56)m where (H	11) is from	n Appendix	Н	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 3	32.01 32.01 30.9	98 32.01	30.98	32.01		(57)
Primary circuit loss (annual) from Table 3			0			(58)
Primary circuit loss calculated for each month (59)m = (58	, , ,					
(modified by factor from Table H5 if there is solar water						
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 2	23.26 23.26 22.5	51 23.26	22.51	23.26		(59)
Combi loss calculated for each month (61)m = (60) ÷ 365	× (41)m	_				
(61)m= 0 0 0 0 0 0	0 0 0	0	0	0		(61)
Total heat required for water heating calculated for each r	month (62)m = 0.85	5 × (45)m + (4	16)m + (5	57)m + (59)m + (61)m	
(62)m= 203.42 179.5 188.98 170.06 167.13 150.01 1	144.71 157.91 157.	.35 176.31	185.61	198.75		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative	quantity) (enter '0' if no	solar contributio	n to water	heating)		
(add additional lines if FGHRS and/or WWHRS applies, se	see Appendix G)					
(63)m= 0 0 0 0 0 0	0 0 0	0	0	0		(63)
Output from water heater						
(64)m= 203.42 179.5 188.98 170.06 167.13 150.01 1	144.71 157.91 157.	.35 176.31	185.61	198.75		_
·	Output fror	m water heater (annual)11	12	2079.74	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 ×	(45)m + (61)ml + 0	8 x [(46)m +	(57)m +	- (59)m 1		
, , , , , , , , , , , , , , , , , , ,	(- /)] -	. o x [(. o)	(,	(00)]		
	73.96 78.35 77.3	- 	86.72	91.93		(65)
	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a):	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7 include (57)m in calculation of (65)m only if cylinder is in	73.96 78.35 77.3	84.47 st water is fro	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun	73.96 78.35 77.3 In the dwelling or ho	84.47 st water is fro	86.72 m comm	91.93 nunity he	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.</td><td>33 84.47 ot water is fro</td><td>86.72 m comm</td><td>91.93 nunity he</td><td>ating</td><td></td></t<>	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.	33 84.47 ot water is fro	86.72 m comm	91.93 nunity he	ating	
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.	84.47 ot water is fro	86.72 m comm	91.93 nunity he	ating	
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119. 9a), also see Table 7.01 9.12 12.2	90 Oct 19 119.19 9 5 5 24 15.54	86.72 m comm Nov 119.19	91.93 nunity he Dec 119.19	ating	(66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119. 9a), also see Table 7.01 9.12 12.2	9 Oct 19 119.19 9 5 24 15.54 Table 5	86.72 m comm Nov 119.19	91.93 nunity he Dec 119.19	ating	(66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling</td><td>84.47 ot water is fro ep Oct 19 119.19 5 5 24 15.54 Table 5 19 172.93</td><td>86.72 m comm Nov 119.19 18.14</td><td>91.93 nunity he Dec 119.19</td><td>ating</td><td>(66) (67)</td></t<>	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling	84.47 ot water is fro ep Oct 19 119.19 5 5 24 15.54 Table 5 19 172.93	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19	ating	(66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling fo	9 Oct 19 119.19 9 5 5 24 15.54 Table 5 19 172.93 able 5	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 19.19 1	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling	9p Oct 19 119.19 9 5 5 24 15.54 Table 5 19 172.93 able 5	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19	ating	(66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 3	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for the dwe	33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92	Nov 119.19 18.14 187.76 34.92	91.93 nunity he Dec 119.19 19.33 201.7 34.92	ating	(66) (67) (68) (69)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling fo</td><td>33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92</td><td>86.72 m comm Nov 119.19 18.14</td><td>91.93 nunity he Dec 119.19 19.33 201.7</td><td>ating</td><td>(66) (67) (68)</td></t<>	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling fo	33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for the dwe	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 34.9	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for the dwe	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7 34.92	ating	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 34.	73.96	9p Oct 19 119.19 9 5 5 19 172.93 14.92 0 0 35 -95.35	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0	ating	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 3	73.96	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7.55 Include (57)m in calculation of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the cyli	73.96	33 84.47 of water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92 0 35 -95.35 7.4 113.53 m + (70)m + (71)	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45 mm + (72)mm	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70) (71)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in the state of th	73.96	33 84.47 of water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92 0 35 -95.35 7.4 113.53 m + (70)m + (71)	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45 mm + (72)mm	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	х	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	х	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	x	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	x	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	x	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	x	3.26	x	28.07	X	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	X	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	x	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67		0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	X	62.67		0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	X	85.75		0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	X	85.75		0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	X	106.25		0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25		0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15		0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	X	104.39		0.24	X	0.7	=	66.97	(79)

Southwest _{0.}	•	×	0.6	35	x	10	04.39		0.24		X	0.7	=	7.9	(79)
Southwest _{0.}	9x 0.77	X	5.5	51	X	9	2.85]		0.24	Х	0.7	=	59.56	(79)
Southwest _{0.}	9x 0.77	×	0.6	35	x	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwest _{0.}	9x 0.77	×	5.5	51	x	6	9.27]		0.24	x	0.7	=	44.43	(79)
Southwest _{0.}	9x 0.77	×	0.6	35	x	69.27]		0.24	X	0.7	=	5.24	(79)
Southwest _{0.}	9x 0.77	×	5.5	51	x	4	4.07]		0.24	X	0.7	=	28.27	(79)
Southwesto.	9x 0.77	×	0.6	65	x	4	4.07]		0.24	x	0.7	=	3.34	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	3	1.49]		0.24	x [0.7	=	20.2	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	3	1.49			0.24	x	0.7	=	2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 45.		130.97	190.29	238.71		18.23	234.64	196	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts								
(84)m= 459	.55 495.72	530.19	568.54	595.68	58	34.66	557.68	525	.64	490.82	457.56	440.55	441.4		(84)
7. Mean ir	nternal tem	perature	(heating	season)										
Temperat	ure during l	neating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisation	factor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)								
Ja	n Feb	Mar	Apr	May	Ι,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.97	0.9	С).74	0.56	0.6	52	0.86	0.98	1	1		(86)
Mean inte	rnal tempe	rature in	living ar	ea T1 (fo	ollo	w ste	ps 3 to 7	7 in T	able	e 9c)		•		•	
(87)m= 19.	<u> </u>	20.29	20.57	20.82		0.96	20.99	20.9		20.9	20.6	20.25	19.97		(87)
Tomporat	ure during l	noating p	oriode ir	roct of	طس	allina	from To	hla (. Th			1	1		
(88)m= 20.		20.1	20.11	20.11	_	0.12	20.12	20.	_	20.12	20.11	20.11	20.1		(88)
` ′				<u> </u>				<u> </u>				1			, ,
	factor for g		0.96		_	m (se	0.46	É	., 1	0.8	0.97	0.99	1 1		(89)
(11)		0.99		0.87				0.5				0.99	1		(69)
	rnal tempe				_				$\overline{}$					ı	
(90)m= 18.	74 18.9	19.18	19.59	19.92	2	0.09	20.12	20.	12	20.03	19.63	19.13	18.72		(90)
										Ť	LA = LIV	ing area ÷ (4) =	0.26	(91)
Mean inte	rnal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2					
(92)m= 19.	06 19.2	19.47	19.84	20.15	2	0.32	20.34	20.3	34	20.25	19.88	19.42	19.04		(92)
,	ustment to t	_			_			_				_		Ī	
(93)m= 19.		19.47	19.84	20.15	2	0.32	20.34	20.	34	20.25	19.88	19.42	19.04		(93)
·	neating req											(T-5)			
	he mean in tion factor f				ned	at ste	ep 11 of	labl	e 9b	o, so tha	t Ti,m=	(76)m an	d re-cald	culate	
Ja		Mar	Apr	May	Γ.	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec		
	factor for g		•			o arr			<u> </u>	ООР		1			
(94)m= 1	 _	0.99	0.96	0.87	C	0.68	0.48	0.5	54	0.81	0.97	0.99	1		(94)
Useful gai	ns, hmGm	, W = (94	1)m x (8	4)m									!		
(95)m= 457	.75 492.4	522.36	543.92	518.18	39	96.76	269.39	281	.48	398.9	441.56	437.05	440.01		(95)
Monthly a	verage exte	ernal tem	perature	from T	able	e 8									
(96)m= 4.3	3 4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m]			•	
(97)m= 1106	5.97 1069.98	967.54	805.76	620.97	41	14.55	271.47	285	.14	448.72	681.83	909.67	1101.74		(97)

(98)m= 483.02 388.13 331.21 188.52 76.47 0 0 0 178.77 340.28 492.33		
Total per year (kWh/year) = Sum(98) _{15,912} =	2478.73	(98)
Space heating requirement in kWh/m²/year	32.59	(99)
8c. Space cooling requirement		
Calculated for June, July and August. See Table 10b		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 681.81 536.74 549.81 0 0 0 0		(100)
(100)m= 0 0 0 0 681.81 536.74 549.81 0 0 0 0 Utilisation factor for loss hm		(100)
(101)m= 0 0 0 0 0 0.9 0.95 0.93 0 0 0 0		(101)
Useful loss, hmLm (Watts) = (100)m x (101)m		, ,
(102)m= 0 0 0 0 0 610.8 509.45 512.46 0 0 0		(102)
Gains (solar gains calculated for applicable weather region, see Table 10)		
(103)m= 0 0 0 0 0 759.25 726.17 689.83 0 0 0		(103)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103) m – (102) m] x (4 set (104) m to zero if (104) m < 3 \times (98) m	1)m	
(104)m= 0 0 0 0 0 106.88 161.24 131.96 0 0 0		
Total = Sum(104) =	400.08	(104)
Cooled fraction $f C = \text{cooled area} \div (4) =$	0.59	(105)
Intermittency factor (Table 10b) (106)m= 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0		
Total = Sum(104) =	0	(106)
Space cooling requirement for month = (104) m × (105) × (106) m		(,
(107)m= 0 0 0 0 0 15.63 23.58 19.3 0 0 0		
Total = Sum(1,0,7) =	58.52	(107)
Space cooling requirement in kWh/m²/year $(107) \div (4) =$	0.77	(108)
9b. Energy requirements – Community heating scheme		
This part is used for space heating, space cooling or water heating provided by a community scheme.		7(204)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) =	1	(301)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the least sources is the least source of the several sources.	1	=
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) =	1	=
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.	1 atter	(302)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP	1 ntter 0.13	(302) (303a)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2	1 0.13 0.87	(302) (303a) (303b)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP (302) x (303a) =	1 0.13 0.87 0.13	(302) (303a) (303b) (304a)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2	1 0.13 0.87 0.13 0.87	(302) (303a) (303b) (304a) (304b)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Fractor for control and charging method (Table 4c(3)) for community heating system	1 0.13 0.87 0.13 0.87 1	(302) (303a) (303b) (304a) (304b) (305) (306)
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the laincludes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community CHP Fraction of community heat from heat source 2 Fraction of total space heat from Community CHP Fraction of total space heat from community heat source 2 Fraction of total space heat from community heat source 2 Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system	1 0.13 0.87 0.13 0.87 1 1.05	(302) (303a) (303b) (304a) (304b) (305) (306)

					_
Space heat from heat source 2		(98) x (304b) >	(305) x (306) =	2264.32	(307b)
Efficiency of secondary/supplement	ntary heating system in % (f	rom Table 4a or Appe	ndix E)	0	(308
Space heating requirement from se	econdary/supplementary sy	stem (98) x (301) x	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2079.74	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) >	(305) x (306) =	283.88	(310a)
Water heat from heat source 2		(64) x (303b) >	(305) x (306) =	1899.84	(310b)
Electricity used for heat distribution	1	0.01 × [(307a)(30	7e) + (310a)(310e)] =	47.86	(313)
Cooling System Energy Efficiency	Ratio			4.73	(314)
Space cooling (if there is a fixed co	ooling system, if not enter 0	= (107) ÷ (314) =	12.38	(315)
Electricity for pumps and fans within mechanical ventilation - balanced,	• · · · · · · · · · · · · · · · · · · ·	m outside		162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (330	0b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Ap	ppendix L)			332.22	(332)
Electricity generated by PVs (Appe	endix M) (negative quantity)			-162.5	(333)
Electricity generated by wind turbin	ne (Appendix M) (negative o	quantity)		0	(334)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit					⊣
rieat emolericy of Orni drift				63	(362)
rieat emolericy of or it unit		Energy	Emission factor	Emissions	(362)
		Energy kWh/year	Emission factor		(362)
Space heating from CHP)	(307a) × 100 ÷ (362) =			Emissions	(362)
	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	kg CO2/kWh	Emissions kg CO2/year	-
Space heating from CHP)		kWh/year	0.22	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year 537.06	0.22 0.52	Emissions kg CO2/year	(363)
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	537.06 × 164.34 × 450.61 ×	0.22 0.52 0.22 0.52	116 -85.29 97.33 -71.56	(363) (364) (365)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	537.06 × 164.34 × 450.61 × 137.89 ×	0.22 0.52 0.52 0.52 0.60 (366) for the second fu	Emissions kg CO2/year 116 -85.29 97.33 -71.56	(363) (364) (365) (366)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	537.06 × 164.34 × 450.61 × 137.89 × ing two fuels repeat (363) to	0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.2	116 -85.29 97.33 -71.56	(363) (364) (365) (366) (367b)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us 2 [(307b)	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.66) for the second fur 0.22 0.52	### Emissions Kg CO2/year	(363) (364) (365) (366) (367b) (368)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us 2 [(307b) on nity systems	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	### Emissions Kg CO2/year	(363) (364) (365) (366) (367b) (368) (372)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) on nity systems g (secondary)	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	### Emissions Kg CO2/year 116 -85.29 97.33 -71.56 el 96.7 = 930.15 = 24.84 = 1011.48	(363) (364) (365) (366) (367b) (368) (372) (373)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use 2 [(307b) on nity systems g (secondary) onmersion heater or instantal	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	### Emissions Kg CO2/year 116 -85.29 97.33 -71.56 96.7 = 930.15 = 24.84 = 1011.48 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) on nity systems g (secondary) nmersion heater or instantal and water heating	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	PEMISSIONS kg CO2/year 116 -85.29 97.33 -71.56 el 96.7 = 930.15 = 24.84 = 1011.48 = 0 = 0	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) on nity systems g (secondary) nmersion heater or instantal and water heating	kWh/year 537.06	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52 0.52 0.52	### Emissions Kg CO2/year 116 -85.29 97.33 -71.56 96.7 = 930.15 = 24.84 = 1011.48 = 0 = 0 1011.48	(363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)

CO2 associated with electricity for lighting (332))) x 172.42 (379)0.52 Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) 0.52 -84.34 Total CO2, kg/year sum of (376)...(382) = (383) 1190.51 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ 15.65 (384)El rating (section 14) (385)86.82

		Hear F	Details:						
A consequently and	Objects the above the	USELL		- NI			OTDO	04.0000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 n: 1.0.4.10	
Software Hame.		Property	Address				VCISIO	11. 1.0.4.10	
Address :									
1. Overall dwelling dime	ensions:								
Basement			a(m²)	(4-)		ight(m)	7(0=)	Volume(m³)	_
	- \ . (41 \ . (4 \ . \ . (4 1 \ . (4 \ . \ . (4 1 \ . (4 \ . \ . \ . (4 1 \ .) \ . (4 1 \ .) \ . (4 1 \ . \ . (4 1 \ . \ . (4 1 \ . \ . (4 1 \ .) \ . (4 1 \ .) \ . (4 1 \ . \ . (4 1 \ . \ . (4 1 \ . \ . (4 1 \ .) \ . (4 1 \ .) \ . (4 1 \ .) \ . (4 1 \ .) \			(1a) x		2.6	(2a) =	192.56	(3a)
•	a)+(1b)+(1c)+(1d)+(1e)+(1	n) <u>7</u>	74.06	(4)	\	n (5)	(a.)		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	192.56	(5)
2. Ventilation rate:	main seconda	rv	other		total			m³ per hou	r
Neural an of alcient acce	heating heating	<u> </u>					40 =	-	_
Number of chimneys	0 + 0	_	0] = [0			0	(6a)
Number of open flues	0 + 0	+	0	」 ⁻	0		20 =	0	(6b)
Number of intermittent fa				L	0	X '	10 =	0	(7a)
Number of passive vents	3				0	X	10 =	0	(7b)
Number of flueless gas f	ires				0	X	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	eys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6a)+(6a)+(6a)+(6a)+(6a)+(6a)+(6a$	7a)+(7b)+((7c) =	Г	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce			continue fr			. (0) –	0	(0)
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber frame of the steel o			•	ruction			0	(11)
deducting areas of openi	_	o inc great	ici wali arc	a (anoi					
·	floor, enter 0.2 (unsealed) or ().1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
· ·	s and doors draught stripped		0.05 (0.0	(4.4) 4	1001			0	(14)
Window infiltration			0.25 - [0.2		_	. (15) -		0	(15)
Infiltration rate	aEO overseed in subject that	00 nor h	(8) + (10)				oroo	0	(16)
•	q50, expressed in cubic metr lity value, then $(18) = [(17) \div 20] +$	-	•	•	elle oi e	rivelope	area	3	(17)
·	es if a pressurisation test has been do				is beina u	sed		0.15	(18)
Number of sides sheltered			5 1	,	3			2	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	x (20) =				0.13	(21)
Infiltration rate modified	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m = 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
		1							

Adjusted infiltr	ation rate (a	allowin	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0).16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effe		-	ate for t	he appli	cable ca	se	•	!	•				
	al ventilation		- d'a N. (O	OL) (00 ·		(/	NEW - de-		\ (00-)		ļ	0.5	(23a
If exhaust air h) = (23a)		ļ	0.5	(23k
	h heat recovery		-	_								76.5	(230
a) If balance						- 	- 	í `	r Ó Ó		r ` ´	÷ 100]	(0.4
(24a)m= 0.28	ļ l).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(248
b) If balance						, , `	MV) (24k	í `	2b)m + (2	<u> </u>			
(24b)m= 0		0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h if (22b)r	nouse extrac n < 0.5 × (23								.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilation on the contract ventilation of the contract ventilation ventilation of the contract ventilation ve								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate	e - ent	ter (24a	or (24k	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.28	0.28 0).27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3. Heat losse	s and heat l	loss pa	aramete	er:			•						
ELEMENT	Gross area (m²		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/l	<)	k-value kJ/m²-ł		A X k kJ/K
Doors					2.6	X	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type	e 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type	e 4				0.65	x1	/[1/(1.2)+	0.04] =	0.74	=			(27)
Walls Type1	67.78	7 1	20.58	3	47.2	x	0.15	i	7.08	<u> </u>			(29)
Walls Type2	24.47	7	2.6	=	21.87	=	0.15	=	3.28	=			(29)
Walls Type3	5.93	╡╏	0	=	5.93	=	0.15	=	0.89	-		7 H	(29)
Total area of e		 2			98.18	=	00		0.00				(31)
Party wall	, , , , , , , , , , , , , , , , , , , ,				12.38	=	0		0	– [(32)
Party floor						=			U			╡┝	(32)
					74.06	=						-	
-					. /// ()/-) I				L			(32)
Party ceiling	I roof windows	uso off	factiva wi	ndow II v	74.06		a formula 1	/[/1/ L val	10 1 1 0 0 1 1 0	e aivon in	naraaranh	22	
-					alue calcul		g formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	n paragraph	3.2	
Party ceiling * for windows and ** include the area	as on both side	es of inte	ernal wali		alue calcul		g formula 1 (26)(30		ıe)+0.04] a	s given in	n paragraph	37.93	(33)
Party ceiling * for windows and ** include the area Fabric heat los	as on both side ss, W/K = S	es of inte	ernal wali		alue calcul) + (32) =	ue)+0.04] a				=
Party ceiling * for windows and	as on both side ss, W/K = S Cm = S(A x	es of inte (A x U (k)	ernal wali J)	ls and par	alue calcul titions	lated using) + (32) = ((28).		2) + (32a).		37.93	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both side ss, W/K = S Cm = S(A x s parameter sments where is	es of into (A x U (k) (TMP the deta	ernal wali J) = Cm ÷	s and par - TFA) ir	alue calcul titions	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(34)
Party ceiling * for windows and ** include the area Fabric heat los Heat capacity	as on both side ss, W/K = S Cm = S(A x s parameter sments where is ead of a detailed	es of into (A x U (k) (TMP the detailed calcul	ernal wall J) = Cm ÷ ails of the lation.	s and par - TFA) ir construct	alue calcul titions n kJ/m²K ion are no	lated using	(26)(30) + (32) = ((28). Indica	(30) + (32	2) + (32a). : Medium	(32e) =	37.93 27828.4	(33) 1 (34) (35)

Total fabric heat	loss						(33) +	(36) =		İ	48.97	(37)
Ventilation heat I		d monthly	V					, ,	25)m x (5)		40.97	(07)
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	17.59 17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat transfer coe	efficient, W/K				I		(39)m	= (37) + (37)	38)m		l	
(39)m= 66.77 6	66.57 66.36	65.35	65.15	64.14	64.14	63.93	64.54	65.15	65.55	65.96		
Heat loss parame	eter (HLP), W	/m²K			•	•		Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	65.3	(39)
(40)m= 0.9	0.9 0.9	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
Number of days	in month (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28 31	30	31	30	31	31	30	31	30	31		(41)
	•	•	•	•		•			•		!	
4. Water heating	g energy requ	irement:								kWh/ye	ear:	
A	NI									·	ı	
Assumed occupation of TFA > 13.9, I		: [1 - exp	(-0.0003	349 x (TF	FA -13.9)2)1 + 0.0	0013 x (ΓFA -13.		34		(42)
if TFA £ 13.9, I			((11		,_,,	(-,			
Annual average I								o toract o		.79		(43)
Reduce the annual a not more that 125 litr	-			_	-	io acriieve	a water us	se largel o	I			
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in lit			,				ОСР	001	1404	DCC		
(44)m= 98.77 S	95.17 91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
. ,	I	l					-	Γotal = Su	I m(44) ₁₁₂ =		1077.45	(44)
Energy content of ho	t water used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 146.47 1	128.1 132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		
If in atomic no our water	or booting at nain	t of woo /no	bot water	· otorogol	antar O in	havea (46		Γotal = Su	m(45) ₁₁₂ =	=	1412.71	(45)
If instantaneous water			ı		ı				T		1	(40)
(46)m= 21.97 1 Water storage los	19.22 19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(46)
Storage volume		ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community hea	` ,				_							, ,
Otherwise if no s	•		•			` '	ers) ente	er '0' in (47)			
Water storage lo												
a) If manufacture			or is kno	wn (kWł	n/day):					0		(48)
Temperature fac										0		(49)
Energy lost from	_	-		!		(48) x (49)	=		1	10		(50)
b) If manufactureHot water storage		-							0	02		(51)
If community hea			0 2 (, 0, 00	• 7 /				0.	02		(01)
Volume factor from	-								1.	03		(52)
Temperature fac	tor from Table	2b							0	.6		(53)
Energy lost from	_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter (50) or (54	1) in (55)								1.	03		(55)

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	-	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if constant of the consta	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Append	only if c May 117.03 L, equati 7.53 dix L, eq	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 iion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in Ap 14.7 (Table 5 0 n (negation 5)	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 Dee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

																_
Southwest _{0.9x}	<u> </u>	x	0.6	S5	X	10	04.39] [0.24	X	0.7		=	7.9	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85			0.24	X	0.7		=	59.56	(79)
Southwest _{0.9x}	0.77	X	0.6	35	X	9	2.85] [0.24	Х	0.7		=	7.03	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	6	9.27] [0.24	x	0.7		=	44.43	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	x	6	9.27] [0.24	x	0.7		=	5.24	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	4	4.07] [0.24	x	0.7		=	28.27	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	X	4	4.07] [0.24	x	0.7		=	3.34	(79)
Southwest _{0.9x}	0.77	х	5.5	51	x	3	1.49] [0.24	x	0.7		=	20.2	(79)
Southwest _{0.9x}	0.77	X	0.6	35	x	3	1.49] [0.24	x	0.7		=	2.38	(79)
Solar gains in	watts, ca	alculated	for eac	h month				(83)m	= Su	ım(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.0	5		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts								1	
(84)m= 453.33	489.52	524.22	562.95	590.51	57	79.86	553.11	521.	.02	485.99	452.34	434.89	435.3	38		(84)
7. Mean inte	rnal temp	perature	(heating	season)											
Temperature	e during h	neating p	eriods ir	n the livi	ng :	area 1	from Tab	ole 9,	Th1	1 (°C)					21	(85)
Utilisation fa	ctor for g	ains for l	living are	ea, h1,m	(Se	ee Ta	ble 9a)			, ,						
Jan	Feb	Mar	Apr	May	È	Jun	Jul	Αι	ug	Sep	Oct	Nov	De	c		
(86)m= 1	1	0.99	0.96	0.87	(0.68	0.51	0.5	6	0.82	0.97	0.99	1			(86)
Mean interna	al temner	ature in	living ar	aa T1 (fo	مااد	w sta	ns 3 to 7	in T	ahle	9c)					l	
(87)m= 20.12	20.22	20.41	20.67	20.88	_	0.98	21	21	$\overline{}$	20.94	20.68	20.36	20.1	ı		(87)
` '	<u> </u>	ı		l				<u> </u>								, ,
Temperature (88)m= 20.17	20.17	20.17	eriods ir 20.18	20.18	_	elling 20.2	20.2	20.	_	20.19	20.18	20.18	20.1	0		(88)
(88)m= 20.17	20.17	20.17	20.10	20.10		20.2	20.2	20.		20.19	20.16	20.16	20.1	0		(00)
Utilisation fa	, 	1		welling,	_		i	9a)							ı	
(89)m= 1	0.99	0.99	0.95	0.83	(0.61	0.42	0.4	6	0.76	0.96	0.99	1			(89)
Mean interna	al temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)					
(90)m= 18.98	19.14	19.41	19.79	20.07	2	0.18	20.2	20.	2	20.14	19.81	19.35	18.9	7		(90)
		-								f	LA = Liv	ing area ÷ (4) =		0.26	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	llind	a) = fl	LA x T1	+ (1 -	– fL/	A) x T2				•		
(92)m= 19.28	19.42	19.67	20.02	20.28	1	0.39	20.41	20.4	T	20.35	20.04	19.62	19.2	7		(92)
Apply adjust	ment to t	he mear		l temper	ı atu	re fro	m Table	4e, \	whe	re appro	priate	<u> </u>				
(93)m= 19.28	19.42	19.67	20.02	20.28	_	0.39	20.41	20.4	$\overline{}$	20.35	20.04	19.62	19.2	7		(93)
8. Space he	ating requ	uirement														
Set Ti to the	mean int	ternal ter	nperatu	re obtair	ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	(76)m an	d re-c	alc	ulate	
the utilisation	n factor fo	or gains	using Ta	ble 9a			·					·			ı	
Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	De	C		
Utilisation fa	 				_							_			l	
(94)m= 1	0.99	0.98	0.95	0.84	(0.63	0.44	0.4	.9	0.77	0.96	0.99	1			(94)
Useful gains	1	· `	<u> </u>									T			I	(05)
(95)m= 451.4	485.81	515.02	532.37	494.54	<u> </u>	53.28	243.33	254.	./1	375.02	432.78	430.93	433.9	1 1		(95)
Monthly ave	T .	1	i –	i e	_		16.0	40	<u>, I</u>	111	10.0	7.4	4.0			(96)
(96)m= 4.3	4.9	6.5	8.9	11.7	<u> </u>	14.6	16.6	16.		14.1	10.6	7.1	4.2			(30)
Heat loss rate (97)m= 1000.34		an intern 874.16	726.52	558.89	_	,W = 71.5	=[(39)m : 244.09	x [(93 256.	' T	- (96)m 403.5] 615.07	820.41	993.7	72		(97)
(37)111= 1000.34	1 300.7	0/4.10	120.52	550.69	3	i 1.0	244.09	230.	. 14	400.0	013.07	020.41	993.1			(01)

Space	e heatin	g require	ement fo	or each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4	1)m			
(98)m=	408.42	323.16	267.2	139.79	47.88	0	0	0	0	135.63	280.42	416.5		
				•				Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2018.99	(98)
Space	e heatin	g require	ement in	kWh/m²	² /year							[27.26	(99)
8c. S	pace co	oling req	uiremer	nt								_		
Calcu	lated fo	r June, J	luly and	August.	See Tal	ble 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat (100)m=		e Lm (ca	lculated 0	using 25	o°C inter	nal tem 602.87	perature 474.6	and exte	ernal ter	nperatur 0	e from 1	able 10)		(100)
` '		tor for lo				602.67	474.0	400.09			0	U		(100)
(101)m=		0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
		ımLm (V	/atts) =	(100)m x	L : (101)m	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>!</u>	ļ			
(102)m=		0	0	0	0	566.25	462.49	468.37	0	0	0	0		(102)
Gains	(solar	gains cal	culated	for appli	cable w	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
				or month, < 3 × (98		dwelling,	continu	ous (kW	h = 0.0)24 x [(10	03)m – (102)m] x	c (41)m	
(104)m=		0	0	0	0	133.74	191.02	159.52	0	0	0	0		
									Tota	l = Sum((104)	=	484.28	(104)
	d fraction								f C =	cooled	area ÷ (4	1) =	0.6	(105)
		actor (Ta		i 		0.05	0.05	0.05		Ι ,				
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0 = Sum((104)	0		(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	m	TOLA	ı — Surrı	IM T)	_ [0	(100)
(107)m=	0	0	0	0	0	20.09	28.69	23.96	0	0	0	0		
									Tota	l = Sum(107)	=	72.75	(107)
Space	cooling	requirer	nent in l	دWh/m²/y	/ear				(107) ÷ (4) =			0.98	(108)
9b. En	ergy rec	quiremer	ıts – Coı	mmunity	heating	scheme	;							
								ting prov			unity sch	neme.		7(004)
	•			•		•	•	(Table 1	1) 'U' IT N	one		[0	(301)
Fraction	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	•					•		allows for See Appe		up to four	other heat	sources; th	ne latter	
		at from C	-		asie neat i	TOTT POWE	r stations.	оес Арреі	ildix C.			[0.13	(303a)
Fraction	n of cor	nmunity	heat fro	m heat s	source 2							[0.87	(303b)
Fraction	n of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fraction	n of tota	al space	heat fro	m comm	unity he	eat sourc	e 2			(3	02) x (303	b) = [0.87	(304b)
		•			•			unity hea	ating sys			· [1	(305)
				12c) for (-	J - , -			L [1.05	(306)
	heating		(-, -		,	J - J - · · ·					L	kWh/yea	
-		heating	requiren	nent								ſ	2018.99	
Space	heat fro	m Comr	nunity C	HP					(98) x (3	04a) x (30	5) x (306) :	<u> </u>	275.59	(307a)
			-									L		

					_
Space heat from heat source 2		(98) x (304b) :	x (305) x (306) =	1844.35	(307b)
Efficiency of secondary/supplement	ntary heating system in % (from Table 4a or Appe	ndix E)	0	(308
Space heating requirement from se	econdary/supplementary sy	ystem (98) x (301) x	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2063.55	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a)	x (305) x (306) =	281.67	(310a)
Water heat from heat source 2		(64) x (303b)	x (305) x (306) =	1885.05	(310b)
Electricity used for heat distribution	١	0.01 × [(307a)(30	7e) + (310a)(310e)] =	42.87	(313)
Cooling System Energy Efficiency	Ratio			4.73	(314)
Space cooling (if there is a fixed co	poling system, if not enter (= (107) ÷ (314	1) =	15.4	(315)
Electricity for pumps and fans withi mechanical ventilation - balanced,	O \ ,	m outside		158.57	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh	/year	=(330a) + (33	0b) + (330g) =	158.57	(331)
Energy for lighting (calculated in Ap	ppendix L)			325.25	(332)
Electricity generated by PVs (Appe	endix M) (negative quantity)		-158.19	(333)
Electricity generated by wind turbin	ne (Appendix M) (negative	quantity)		0	(334)
					_
12b. CO2 Emissions – Community	heating scheme				
12b. CO2 Emissions – Community Electrical efficiency of CHP unit	heating scheme			30.6	(361)
·	heating scheme			30.6	(361)
Electrical efficiency of CHP unit	heating scheme	Energy	Emission factor	63 Emissions	Ⅎ`
Electrical efficiency of CHP unit Heat efficiency of CHP unit		kWh/year	Emission factor	63	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =			63 Emissions	Ⅎ`
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$	kWh/year 437.45 ×	kg CO2/kWh	63 Emissions kg CO2/year	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year 437.45	0.22 0.52	63 Emissions kg CO2/year 94.49 -69.47	(362)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 437.45	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01	(362) (363) (364) (365)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP u	kWh/year 437.45	0.22 0.52 0.52 0.52 0.60 for the second fundamental	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01	(362) (363) (364) (365) (366)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP use	kWh/year 437.45	0.22 0.52 0.52 0.52 0.52 0.60 for the second fue	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7	(362) (363) (364) (365) (366) (367b)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$(307a) \times 100 \div (362) =$ $-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP upon	kWh/year 437.45	0.22 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04	(362) (363) (364) (365) (366) (367b) (368)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses the constitution of the	kWh/year 437.45	kg CO2/kWh 0.22 0.52 0.52 0.66) for the second function of the s	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04 = 22.25	(362) (363) (364) (365) (366) (367b) (368) (372)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses the constitution of the	kWh/year 437.45	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04 = 22.25 = 905.87	(362) (363) (364) (365) (366) (367b) (368) (372) (373)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses the constant of the	kWh/year 437.45	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04 = 22.25 = 905.87 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses the construction of the	kWh/year 437.45	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04 = 22.25 = 905.87 = 0 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)
Electrical efficiency of CHP unit Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP uses the constant of the	kWh/year 437.45	kg CO2/kWh 0.22 0.52 0.52 0.52 0.22 0.52 0.22 0.52 0.52 72)	63 Emissions kg CO2/year 94.49 -69.47 96.57 -71.01 el 96.7 = 833.04 = 22.25 = 905.87 = 0 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)

CO2 associated with electricity for lighting (332))) x 168.8 (379)0.52 Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) 0.52 -82.1 Total CO2, kg/year sum of (376)...(382) = (383) 1082.86 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ 14.62 (384)El rating (section 14) (385)87.81

		l lser I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	Property	Address	: Flat 2-2	2-Green				
Address: 1. Overall dwelling dime	ensions:								
1. Overall awelling aime	,	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	197.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.06	(4)			-		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	_ + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins			Ī	0	x ′	10 =	0	(7a)
Number of passive vents	3			Ī	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				_			A in a b	ongoo nor he	
	, o flues and force (60) (6b) (7a) ı (7b) ı	(70) -	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in t		, ,,				,		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o trie grea	ter wall are	a (anter					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2) v (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)
	q50, expressed in cubic metro	es per h					area	3	(17)
,	lity value, then $(18) = [(17) \div 20] + (18)$	•	•	•				0.15	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltere	ed		(20) 4	[0.075 v./r	10\1			3	(19)
Shelter factor	ting chalter feater		(20) = 1 - (21) = (18)		19)] =			0.78	(20)
Infiltration rate incorporations and infiltration rate modified f	•		(21) = (10) X (20) =				0.12	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	1 3	1	1	1 -		l	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) == (2	2)m · 4	-	-	•	-	-		-	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	<u> </u>	1.08	1.12	1.18]	
1.27	1 0.99	1 0.00	1 0.02	<u> </u>	1	12	Lo	J	

0.15	ation rate	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1		
alculate effec		_	rate for t	he appli	cable ca	ise	ļ		ļ			J 		_
If mechanica				(. (00)	\				0.5	(2:
If exhaust air he) = (23a)				0.5	(23
If balanced with		-	-	_									76.5	(2:
a) If balance			1	i		- 	- 	í `	r Ó - Ò		- `) ÷ 100] 7		(2
4a)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	J		(2
b) If balance			1	i	1		, 	ŕ	r Ó		Ι .	7		(2
(4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J		(2
c) If whole h	ouse ext n < 0.5 ×			•	•				5 v (23h	.\				
4c)m = 0	0.5 x	0	0	0 = (231)		0	$\frac{1}{1} = (221)$	0	0	0	0	1		(2
d) If natural												J		_
,	n = 1, the								0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(2
Effective air	change i	rate - er	 nter (24a) or (24l	b) or (24	c) or (24	ld) in bo	x (25)	•		•	-		
5)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	1		(2
B. Heat losses	s and ha	at loss r	narameti	or.	•							_		
LEMENT	Gros	·	Openin		Net Ar	ea	U-val	ue	AXU		k-valu	e	Α	Χk
	0.00												, ,	
	area	(m²)	m		Α,ι		W/m2		(W/ł	<)	kJ/m²-		kJ	J/K
oors	area ((m²)								<) 			kJ	J/K
		(m²)			1, A	m² x	W/m2	2K =	(W/ł	<) 			kJ	J/K (2
indows Type	: 1	(m²)			A ,ı	m ² x	W/m2	2K = 	(W/ł 3.12	<) 			kJ	J/K (2 (2
indows Type indows Type	e 1 e 2	(m²)			A ,ı 2.6	m ² x x1 x1	W/m2 1.2 /[1/(1.2)+	eK = 0.04] = 0.04] =	3.12 3.73	<) 			kJ	J/K (2 (2
indows Type indows Type indows Type	e 1 e 2 e 3	(m²)			A ,1 2.6 3.26 3.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+	eK = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52	<)			k J	J/K (2 (2 (2
indows Type indows Type indows Type indows Type	2 2 3 4			<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74	<)			kJ	J/K (; (; (; (;
indows Type indows Type indows Type indows Type alls Type1	2 2 3 4 38.14	4	20.58	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+	2K = 0.04] = 0.04] = 0.04] = 0.04] =	3.12 3.73 4.52 6.31 0.74 2.63				kJ	J/K (2 (2 (2 (2 (2
oors findows Type findows Type findows Type findows Type falls Type1 falls Type2	2 2 3 3 4 4 38.14 23.92	4 2	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2	<>			kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3	23.92 3.14 23.92 5.95	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	J/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type indows Type alls Type1 alls Type3 alls Type4	38.14 23.92 5.95 29.5	4 2 5	20.56 2.6	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15	2K = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2				kJ	(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)
findows Type findows Type findows Type findows Type falls Type1 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 21.32 5.95 29.5	m² x1 x1 x1	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 29.57 12.38	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15	EK = 0.04] = 0	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89				kJ	
indows Type indows Type indows Type indows Type alls Type1 falls Type2 falls Type3 falls Type4 otal area of e arty wall arty floor	38.14 23.92 5.95 29.5	4 2 5	20.5a	<u>,</u>	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06	m ²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15	2K = 0.04 = 0.04 = 0.04 = = = = =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43				kJ	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 29.52 29.53	4 2 5 1 1 m ²	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 = 0.04 = 0.04 = = = = = = =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	K	kJ	//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and finclude the area	23.92 23.92 23.92 23.92 29.52 29.52 29.52 29.52 29.52	4 2 5 1 , m ² ows, use e	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of	EK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
indows Type indows Type indows Type indows Type alls Type1 alls Type2 alls Type3 alls Type4 otal area of e arty wall arty floor arty ceiling or windows and include the area abric heat los	23.92 38.14 23.92 5.95 29.57 29.57 29.67 29.	4 2 1 1 , m ² ows, use e sides of in = S (A x	20.58 2.6 0 0	8	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.32 5.95 97.52 12.33 76.06 76.06 alue calculation and a second a second and a second and a second and a second and a second and a second and a second and a second and a second and a second	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0.15	EK = 0.04 =	(W/k 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43	as given in	kJ/m²-	h 3.2	7.84	
findows Type findows Type findows Type findows Type falls Type1 falls Type2 falls Type3 falls Type4 otal area of e farty wall farty floor farty ceiling for windows and	23.92 23.92 23.92 23.92 29.57 29	4 2 1 1 , m ² ows, use e sides of in = S (A x A x k)	20.58 2.6 0 0 orderective with the internal walk	8 8 Indow U-vi	A ,1 2.6 3.26 3.95 5.51 0.65 17.56 21.33 5.95 12.38 76.06 76.06 alue calculatitions	m²	W/m2 1.2 /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ /[1/(1.2)+ 0.15 0.15 0.15 0 on the second of	PK = 0.04 =	(W/h 3.12 3.73 4.52 6.31 0.74 2.63 3.2 0.89 4.43		kJ/m²-	h 3.2		//K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2

if details of therma	0 0	are not kn	own (36) =	= 0.15 x (3	1)								_
Total fabric he								• •	(36) =	(a=)		48.84	(37)
Ventilation hea		1		<u> </u>	Ι.	Ι	I .	` '	·	(25)m x (5)		1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 66.18	65.99	65.8	64.85	64.66	63.71	63.71	63.52	64.09	64.66	65.04	65.42		_
Haat laas mana	t /I	II D) W	/ 21 <i>/</i>							Sum(39) ₁	12 /12=	64.8	(39)
Heat loss para	<u>`</u>		1	0.05	0.04		0.04	` '	= (39)m ÷	<u> </u>	0.00	1	
(40)m= 0.87	0.87	0.87	0.85	0.85	0.84	0.84	0.84	0.84	0.85	0.86	0.86	0.05	(40)
Number of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 / 1 Z=	0.85	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ene	rgy requi	irement:								kWh/y	ear:	
Assumed see	inanai, l	N I										1	(40)
Assumed occu if TFA > 13.9			[1 - exp	(-0.0003	849 x (TI	FA -13 9)2)] + 0 (0013 x (ΓFA -13		.38		(42)
if TFA £ 13.9		6 %	i oxb	(0.000) 10 X (11	7. 10.0	<i>,</i> _,) N O N		,			
Annual averag			•	•	•	_	` ,).82		(43)
Reduce the annua not more that 125	•		• •		_	-	to achieve	a water us	se target o	f		•	
		·	· ·		 	•		_			г_	1	
Jan	Feb	Mar	Apr	May	Jun otor from	Jul Toble 10 Y	Aug	Sep	Oct	Nov	Dec		
Hot water usage is									1	1	1	1	
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9		–
Energy content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,ı	m x nm x C	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
		!			ļ.		!		Total = Su	m(45) ₁₁₂ =	<u>. </u>	1428.9	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				_	
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storage					// IDO		*** *					1	
Storage volum	` '		•			•		ame ves	sel		0		(47)
If community h	•			•			` '		(01 ! /	(47)			
Otherwise if no Water storage		not wate	er (tnis in	iciudes i	nstantar	neous co	moi idmo	ers) ente	er o in (47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/day).					0	l	(48)
Temperature f					(<i>"</i>]]	(49)
Energy lost fro				oar			(48) x (49)				0]]	, ,
b) If manufact		_	-		or is not		(40) X (43)	_		1	10		(50)
Hot water stor			-							0.	.02]	(51)
If community h	-												•
Volume factor										1.	.03]	(52)
Temperature f	actor fro	m Table	2b							0	0.6		(53)
Energy lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03]	(54)
Enter (50) or ((54) in (5	55)								1.	.03		(55)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circui	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by	/ factor f	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-				-	-		
(64)m= 203.42	179.5	188.98	170.06	167.13	150.01	144.71	157.91	157.35	176.31	185.61	198.75		
	•	•					Outp	out from wa	ater heate	r (annual) ₁	12	2079.74	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 93.48	83.02	88.68	81.55	81.41	74.89	73.96	70.2F	77.33	04.47	00.70	21.22		(65)
			01.00	01.41	14.03	73.90	78.35	11.33	84.47	86.72	91.93		(65)
include (57)	m in cal				<u> </u>	<u> </u>		<u> </u>		<u> </u>	<u> </u>	eating	(65)
include (57) 5. Internal g		culation o	of (65)m	only if c	<u> </u>	<u> </u>		<u> </u>		<u> </u>	<u> </u>	eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		<u> </u>		<u> </u>	<u> </u>	eating	(65)
` '	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>	<u> </u>	eating	(63)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	<u> </u>	ater is fr	om com	munity h	eating	(66)
5. Internal g Metabolic gair Jan	ains (see ns (Table Feb 119.19	E Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 119.19	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 119.19	Jul 119.19	Aug 119.19	or hot w Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 119.19	ains (see ns (Table Feb 119.19	E Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 119.19	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 119.19	Jul 119.19	Aug 119.19	or hot w Sep	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81	res (Table Feb 119.19 (calcula	ETable 5 E Table 5 E 5), Wat Mar 119.19 ted in Ap	of (65)m 6 and 5a ts Apr 119.19 opendix 10.29	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraints on the constraint of the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraint of the constraints on the constraint on th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains	res (Table Feb 119.19 (calcula	ETable 5 E Table 5 E 5), Wat Mar 119.19 ted in Ap	of (65)m 6 and 5a ts Apr 119.19 opendix 10.29	only if construction in the construction in th	Jun 119.19 ion L9 o	Jul 119.19 r L9a), a	Aug 119.19 Iso see	Sep 119.19 Table 5	Oct 119.19	Nov	Dec	eating	(66)
5. Internal g Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2	Evaluation of the collection o	of (65)m 5 and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if c May 119.19 L, equati 7.69 dix L, eq 181.11	Jun 119.19 ion L9 of 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 see Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2	Evaluation of the collection o	of (65)m 5 and 5a ts Apr 119.19 opendix 10.29 Appendix 195.93	only if c May 119.19 L, equati 7.69 dix L, eq 181.11	Jun 119.19 ion L9 of 6.49 uation L 167.17	Jul 119.19 r L9a), a 7.01 13 or L1 157.86	Aug 119.19 Iso see 9.12 3a), also	Sep 119.19 Table 5 12.24 see Tal 161.19	Oct 119.19 15.54 ble 5 172.93	Nov 119.19	Dec 119.19	eating	(66) (67)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2 (calcula 34.92	ted in Apulated in	of (65)m s and 5a ts Apr 119.19 opendix 10.29 n Append 195.93 opendix 34.92	May 119.19 L, equati 7.69 dix L, equat L, equat	Jun 119.19 ion L9 of 6.49 uation L 167.17 ion L15	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a)	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2 (calcula 34.92	ted in Apulated in	of (65)m s and 5a ts Apr 119.19 opendix 10.29 n Append 195.93 opendix 34.92	May 119.19 L, equati 7.69 dix L, equat L, equat	Jun 119.19 ion L9 of 6.49 uation L 167.17 ion L15	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a)	Aug 119.19 Iso see 9.12 3a), also 155.67	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table	Oct 119.19 15.54 ble 5 172.93	Nov 119.19 18.14	Dec 119.19 19.33	eating	(66) (67) (68)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 0	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2 (calcula 34.92 ns gains 0	ted in Ap 207.68 ated in Ap 34.92 (Table 5	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 0	only if c May 119.19 L, equati 7.69 dix L, equati 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.49 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.24 see Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
5. Internal g Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa	res (Table Feb 119.19 (calcula 16.71 ins (calcula 213.2 (calcula 34.92 ns gains 0	ted in Ap 207.68 ated in Ap 34.92 (Table 5	of (65)m and 5a ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 0	only if c May 119.19 L, equati 7.69 dix L, equati 181.11 L, equat 34.92	Jun 119.19 ion L9 of 6.49 uation L 167.17 ion L15 34.92	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.24 see Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
5. Internal g Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -95.35	res (Table Feb 119.19 (calcula 16.71 ins (calcula 34.92 ns gains 0 reps.35	ted in Ap 207.68 ulated in Ap 34.92 (Table 5	of (65)m ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 0 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 ion L15 34.92 0 le 5)	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.24 see Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 119.19 (calcula 16.71 ins (calcula 34.92 res gains 0 // aporatio gains (Table Feb 119.19 (calcula 19.19 (calcul	ted in Ap 207.68 ulated in Ap 34.92 (Table 5	of (65)m ts Apr 119.19 ppendix 10.29 Appendix 195.93 ppendix 34.92 5a) 0 tive valu	only if construction only if c	Jun 119.19 ion L9 o 6.49 uation L 167.17 ion L15 34.92 0 le 5)	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92	Aug 119.19 Iso see 9.12 3a), also 155.67 , also se 34.92	Sep 119.19 Table 5 12.24 see Tal 161.19 ee Table 34.92	Oct 119.19 15.54 ble 5 172.93 5 34.92	Nov 119.19 18.14 187.76	Dec 119.19 19.33 201.7	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -95.35 Water heating (72)m= 125.65	res (Table Feb 119.19 (calcula 16.71 ins (calcula 34.92 res gains 0 vaporatio 123.55	ted in Ap 13.59 ulated in 207.68 ated in Ap 34.92 (Table 5 0 on (negative) able 5) able 5) able 5)	of (65)m ts Apr 119.19 ppendix 10.29 Appendix 34.92 5a) 0 tive valu -95.35	only if constructions only if constructions	Jun 119.19 ion L9 o 6.49 uation L 167.17 ion L15 34.92 0 le 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92 0	Aug 119.19 Iso see 9.12 3a), also 155.67 o, also se 34.92 0	Sep 119.19 Table 5 12.24 0 see Tal 161.19 ee Table 34.92 0	Oct 119.19 15.54 ble 5 172.93 5 34.92 0 -95.35	Nov 119.19 18.14 187.76 34.92 0	Dec 119.19 19.33 201.7 0 -95.35	eating	(66) (67) (68) (69) (70) (71)
5. Internal g Metabolic gain Jan (66)m= 119.19 Lighting gains (67)m= 18.81 Appliances ga (68)m= 211.01 Cooking gains (69)m= 34.92 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -95.35 Water heating	res (Table Feb 119.19 (calcula 16.71 ins (calcula 34.92 res gains 0 vaporatio 123.55	ted in Ap 13.59 ulated in 207.68 ated in Ap 34.92 (Table 5 0 on (negative) able 5) able 5) able 5)	of (65)m ts Apr 119.19 ppendix 10.29 Appendix 34.92 5a) 0 tive valu -95.35	only if constructions only if constructions	Jun 119.19 ion L9 o 6.49 uation L 167.17 ion L15 34.92 0 le 5) -95.35	Jul 119.19 r L9a), a 7.01 13 or L1 157.86 or L15a) 34.92 0	Aug 119.19 Iso see 9.12 3a), also 155.67 o, also se 34.92 0	Sep 119.19 Table 5 12.24 See Tal 161.19 ee Table 34.92 0 -95.35	Oct 119.19 15.54 ble 5 172.93 5 34.92 0 -95.35	Nov 119.19 18.14 187.76 34.92 0	Dec 119.19 19.33 201.7 0 -95.35	eating	(66) (67) (68) (69) (70) (71)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	X	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

														_		_
Southwest _{0.9x}	•	x	0.6	S5	X	10	04.39			0.24	X	0.7	:	- <u>L</u>	7.9	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	9	2.85]		0.24	X	0.7	-	= [59.56	(79)
Southwest _{0.9x}	0.77	X	0.6	35	X	9	2.85			0.24	X	0.7	=	= [7.03	(79)
Southwest _{0.9x}	0.77	X	5.5	51	X	6	9.27]		0.24	x	0.7	-	- [44.43	(79)
Southwest _{0.9x}	0.77	X	0.6	S5	x	6	9.27]		0.24	x	0.7	:	= [5.24	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	4	4.07]		0.24	x	0.7		= [28.27	(79)
Southwest _{0.9x}	0.77	Х	0.6	35	x	4	4.07			0.24	x	0.7	-	- [3.34	(79)
Southwest _{0.9x}	0.77	X	5.5	51	x	3	1.49			0.24	х	0.7	-	- [20.2	(79)
Southwest _{0.9x}	0.77	X	0.6	35	x	3	1.49			0.24	x	0.7		• [2.38	(79)
				_												_
Solar gains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 45.33	83.51	130.97	190.29	238.71	24	48.23	234.64	196.	.79	151.24	96.8	55.44	38.05	5		(83)
Total gains –	internal a	nd solar	(84)m =	= (73)m	+ (8	83)m	, watts					_	_			
(84)m= 459.55	495.72	530.19	568.54	595.68	58	84.66	557.68	525.	.64	490.82	457.56	440.55	441.4	ļ.		(84)
7. Mean inte	rnal temp	erature	(heating	season)											
Temperature	e during h	eating p	eriods ir	n the livi	ng	area f	from Tab	ole 9,	, Th	1 (°C)				Г	21	(85)
Utilisation fa	_	٠.			_					,				L		
Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	c		
(86)m= 1	1	0.99	0.96	0.87	(0.68	0.5	0.5	Ť	0.82	0.97	0.99	1	7		(86)
Mean interna	al temper	atura in	livina ar	 aa T1 (f(مالد	w sta	ne 3 to 7	in T	ahle	a 0c)						
(87)m= 20.16	20.26	20.44	20.69	20.89	_	0.98	21	21		20.95	20.7	20.39	20.14			(87)
` '	<u> </u>			l	<u> </u>			<u> </u>	I							` '
Temperature (88)m= 20.19	20.2	eating p	eriods ir 20.21	20.21	_	eiiing 20.22	20.22	20.2		20.22	20.21	20.21	20.2	\neg		(88)
(88)m= 20.19	20.2	20.2	20.21	20.21		.0.22	20.22	20.4	22	20.22	20.21	20.21	20.2			(00)
Utilisation fa	, 				- 			<u> </u>				1		_		
(89)m= 1	0.99	0.99	0.95	0.83		0.6	0.41	0.4	16	0.75	0.96	0.99	1			(89)
Mean interna	al temper	ature in	the rest	of dwell	ing	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9c)	_		_		
(90)m= 19.06	19.21	19.47	19.84	20.1	2	20.21	20.22	20.2	22	20.17	19.86	19.41	19.04	L		(90)
										f	LA = Liv	ing area ÷ (4) =	L	0.26	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	llin	g) = fl	_A × T1	+ (1 -	– fL	A) × T2						
(92)m= 19.34	19.48	19.72	20.05	20.3	2	20.41	20.42	20.4	42	20.37	20.08	19.66	19.32	2		(92)
Apply adjust	ment to t	he mear	interna	temper	atu	re fro	m Table	4e, v	whe	re appro	priate	•				
(93)m= 19.34	19.48	19.72	20.05	20.3	2	20.41	20.42	20.4	42	20.37	20.08	19.66	19.32	2		(93)
8. Space he	ating requ	uirement														
Set Ti to the			•		ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-ca	alcu	ılate	
the utilisation	1			1	_			Π.				1	I _	_		
Jan	Feb	Mar	Apr	May		Jun	Jul	Au	ug	Sep	Oct	Nov	Dec			
Utilisation fa	0.99	0.98	0.95	0.83	Γ,	0.62	0.44	0.4	10	0.77	0.96	0.99	1	\neg		(94)
		L		<u> </u>		J.62	0.44	0.4	ю	0.77	0.96	0.99	1			(34)
Useful gains (95)m= 457.68	1	521.03	537.49	497.01	3(62.92	242.69	254.	15	376.3	437.65	436.65	439.9	٦		(95)
Monthly ave				l			242.00	204.		070.0	407.00	100.00	400.0			(00)
(96)m= 4.3	4.9	6.5	8.9	11.7	_	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	\neg		(96)
Heat loss ra				<u> </u>	_							1	L			•
(97)m= 995.46		869.97	723.39	556.33	_	70.01	243.3	255.	_ _	401.92	612.72	817.11	989.4	2		(97)
	1			<u> </u>	_				!			1	<u> </u>			

Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 400.11	315.8	259.61	133.85	44.13	0	0	0	0	130.25	273.93	408.79		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	1966.47	(98)
Space heatin	g require	ement in	kWh/m²	² /year								25.85	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo	r June, .	July and	August.	See Tal	ble 10b	1	1			ī			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate					· ·	1	ì		<u> </u>		$\overline{}$		(100)
(100)m= 0	0	0	0	0	598.91	471.48	482.78	0	0	0	0		(100)
Utilisation fac	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
Useful loss, h	_					0.50	0.07						()
(102)m = 0	0	0	0	0	566.6	461.21	467.74	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)	l		<u> </u>		
(103)m= 0	0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
Space cooling set (104)m to			-		dwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
(104)m= 0	0	0	0	0	138.71	197.13	165.24	0	0	0	0		
									l = Sum(,	= [501.07	(104)
Cooled fraction		-l-l- 40h	`					f C =	cooled	area ÷ (4	4) =	0.59	(105)
Intermittency for (106)m= 0	actor (1		0	0	0.25	0.25	0.25	0	0	0	0		
(100)					0.20	0.20	0.20		l = Sum(l	=	0	(106)
Space cooling	require	ment for	month =	: (104)m	× (105)	× (106)r	m			-086-7	L		(/
(107)m= 0	0	0	0	0	20.29	28.83	24.17	0	0	0	0		
								Tota	l = Sum(107)	=	73.29	(107)
Space cooling	require	ment in k	دWh/m²/y	/ear				(107)) ÷ (4) =		Γ	0.96	(108)
9b. Energy red	luiremer	nts – Coi	mmunity	heating	scheme)					_		
This part is use										unity scł	neme.		- 1
Fraction of spa	ice heat	from se	condary	/supplen	nentary I	heating	(Table 1	1) '0' if n	one		Ĺ	0	(301)
Fraction of spa	ce heat	from co	mmunity	system	1 – (30	1) =					L	1	(302)
The community so includes boilers, h									up to four	other heat	sources; the	e latter	
Fraction of hea	at from C	Commun	ity CHP									0.13	(303a
Fraction of cor	nmunity	heat fro	m heat s	source 2							Γ	0.87	(303b
Fraction of tota	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a
Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	12c) for (commun	ity heati	ng syste	m					1.05	(306)
Space heating	3										_	kWh/yea	r
Annual space	heating	requiren	nent									1966.47	
Space heat fro	m Comi	munity C	HP					(98) x (30	04a) x (30	5) x (306)	<u> </u>	268.42	(307a)
											<u> </u>		_

Space heat from heat source 2		(98) x (304b) x	(305) x (306) =	1796.37	(307b)
Efficiency of secondary/supplement	ary heating system in % (f	rom Table 4a or Apper	ndix E)	0	(308
Space heating requirement from se	condary/supplementary sy	stem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					
Annual water heating requirement				2079.74	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x	(305) x (306) =	283.88	(310a)
Water heat from heat source 2		(64) x (303b) x	(305) x (306) =	1899.84	(310b)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	42.49	(313)
Cooling System Energy Efficiency F	Ratio			4.73	(314)
Space cooling (if there is a fixed coo	oling system, if not enter 0) = (107) ÷ (314)) =	15.51	(315)
Electricity for pumps and fans within mechanical ventilation - balanced, e	o (,	m outside		162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/	year	=(330a) + (330	0b) + (330g) =	162.85	(331)
Energy for lighting (calculated in Ap	pendix L)			332.22	(332)
Electricity generated by PVs (Apper	ndix M) (negative quantity)			-162.5	(333)
Electricity generated by wind turbine	e (Appendix M) (negative o	quantity)		0	(334)
12b. CO2 Emissions – Community	heating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Heat efficiency of CHP unit				63	(362)
		Energy	Emission factor		
		kWh/year	kg CO2/kWh	kg CO2/year	
Space heating from CHP)	$(307a) \times 100 \div (362) =$	426.07 ×	0.22	92.03	(363)
less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	130.38 ×	0.52	-67.67	(364)
Water heated by CHP	$(310a) \times 100 \div (362) =$	450.61 ×	0.22	97.33	(365)
less credit emissions for electricity	$-(310a) \times (361) \div (362) =$	137.89 ×	0.52	-71.56	(366)
Efficiency of heat source 2 (%)	If there is CHP us	ing two fuels repeat (363) to	(366) for the second fu	96.7	(367b)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	825.63	(368)
Electrical energy for heat distributio	n	[(313) x	0.52	= 22.05	(372)
Total CO2 associated with commun	ity systems	(363)(366) + (368)(37	2)	= 897.81	(373)
CO2 associated with space heating	(secondary)	(309) x	0	= 0	(374)
CO2 associated with water from imi			0.00	= 0	(375)
COZ accociated With Water from Illin	mersion heater or instantal	neous heater (312) x	0.22		 '` ′
Total CO2 associated with space ar		neous heater (312) x (373) + (374) + (375) =	0.22	897.81	(376)
	nd water heating	,	0.52		
Total CO2 associated with space ar	nd water heating	(373) + (374) + (375) = (315) x		897.81	(376)

CO2 associated with electricity for light	ing	(332))) x	0.52	172.42	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appli	cable	0.52 x 0.01 =	-84.34	(380)
Total CO2, kg/year	sum of (376)(382) =			1078.47	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			14.18	(384)
El rating (section 14)				88.06	(385)

		l lear-E	Details:						
Access Nove	Chain Haalinall	– USEITL		_ NI	L		OTDO	046900	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 n: 1.0.4.10	
Software Hume.		Property					. 5.5.0		
Address :		·							
1. Overall dwelling dime	ensions:								
Basement			a(m²)	(1a) x		ight(m)	(2a) =	Volume(m³)) (3a)
	a) · (4b) · (4a) · (4d) · (4a) · (4a)				4	2.6	(2a) =	192.56	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.06	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	192.56	(5)
2. Ventilation rate:	main seconda	ırv	other		total			m³ per hou	
Number of chimneys	heating heating	, □ + □		7 = [40 =	-	_
Number of chimneys		ᆜ	0	<u> </u>	0		20 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0			0	(6b)
Number of intermittent fa				Ļ	0		10 =	0	(7a)
Number of passive vents					0		10 =	0	(7b)
Number of flueless gas f	ires				0	X	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+	(7a)+(7b)+((7c) =	Γ	0		÷ (5) =	0	(8)
If a pressurisation test has b	peen carried out or is intended, proce	ed to (17),	otherwise o	continue fr			` ′	-	」 ` ′
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration	.25 for steel or timber frame o	r ∩ 25 fo	r macani	v consti	ruction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corresponding			•	uction			0	(11)
deducting areas of openi	•	24/22-1	\ -				ı		٦
If suspended wooden in the sus	floor, enter 0.2 (unsealed) or (ter 0.05, else enter 0	o.1 (seale	ea), eise	enter u				0	(12)
•	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)
·	lity value, then $(18) = [(17) \div 20] +$							0.15	(18)
	es if a pressurisation test has been do	one or a de	gree air pe	rmeability	is being u	sed	i		7
Number of sides sheltere Shelter factor	ea		(20) = 1 -	[0.075 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f								00	」 ` ′
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
<u> </u>		•	•		•	•	•	ı	

Adjusted infiltr	ation rate	(allowi	ing for sl	nelter ar	nd wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effect		_	rate for t	he appli	cable ca	se	•	•	•	•		_	
If mechanica			andiv N. (C	12h) - (22	a) v Emy (aguatian (VEVV otho	muiaa (22h	·) - (22a)			0.5	(23
If exhaust air h									i) = (23a)			0.5	(23)
If balanced with		-	-	_					Ola \	005) [4 (00-	76.5	(230
a) If balance (24a)m= 0.28			0.26	0.25	at recov	0.24	HR) (248	0.24	2b)m + (2 0.25	23b) × [0.26	- ` ` `) ÷ 100] 1	(24
	0.28	0.27		ļ	ļ	l	Į	<u>Į</u>		l	0.27	J	(240
b) If balance	ed mecha	nicai ve	entilation 0	without	neat red	overy (i	r ´ ` 	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	2b)m + (2 0	23b) 0	Ι ,	1	(24
(=)							0			0	0	J	(24)
c) If whole h	ouse extr			•	•				.5 × (23b)	_	-	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n	ventilation				•				0.5]			_	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change r	ate - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)	-	-	-	_	
(25)m= 0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27]	(25)
3. Heat losse	s and hea	at loss i	naramet	er.								_	
ELEMENT	Gross area (S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/ł	<)	k-valu kJ/m²·		A X k kJ/K
Doors					2.6	x	1.2	=	3.12				(26)
Windows Type	e 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73	一			(27)
Windows Type	2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type	e 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31	=			(27)
Windows Type	e 4				0.65		/[1/(1.2)+	0.04] =	0.74	Ħ			(27)
Walls Type1		$\overline{}$	20.5	8	47.2	=	0.15		7.08	=			(29)
Walls Type2	24.47	=	2.6		21.87	=	0.15	_	3.28	=		= =	(29)
Walls Type3	5.93		0	=	5.93	=	0.15	=	0.89	╡ ¦			(29)
Roof		=	0	=		=				륵 ¦		-	(30)
Total area of e	19.72				19.72	=	0.15		2.96				
	dernents,	111			117.9	=				i			(31)
Party wall					12.38	=	0	=	0				(32)
Party floor					74.06	=							(32
Party ceiling * for windows and	roof windo	ws, use e	effective wi	ndow U-v	54.34 alue calcul		g formula 1	/[(1/U-valu	ле)+0.04] а	s given ir	n paragrapi		(32)
** include the area	as on both s	sides of ir	nternal wal	ls and par	titions								
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30) + (32) =				40.89	(33)
Heat capacity	Cm = S(A)	Axk)						((28).	(30) + (32	2) + (32a)	(32e) =	26033.88	(34)
Thermal mass	paramet	er (TMF	⊃ = Cm -	: TFA) iı	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
For design assess				construct	tion are no	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f		
can be used inch													
can be used inste Thermal bridge				usina Ar	nendiv I	K						22.81	(36

	of therma	0 0	are not kn	own (36) =	= 0.15 x (3	1)			(00)	(0.0)				— ,,
	abric hea		. 4		_				` '	(36) =	(OE) (E)		63.71	(37)
ventila	ation hea								` ′	·	25)m x (5)			
(20)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(29)
(38)m=	17.8	17.59	17.39	16.38	16.18	15.16	15.16	14.96	15.57	16.18	16.58	16.99		(38)
Heat to	ransfer c	oefficier	nt, W/K					•	(39)m	= (37) + (38)m		ı	
(39)m=	81.5	81.3	81.1	80.08	79.88	78.87	78.87	78.67	79.27	79.88	80.29	80.69		_
∐oot k	oce para	motor (L	JI D) \\//	/m2k/						Average = = (39)m ÷	Sum(39) ₁	12 /12=	80.03	(39)
(40)m=	oss para	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.08	1.09		
(40)111=	'.'	1.1	1.1	1.00	1.00	1.00	1.00	1.00			Sum(40) ₁		1.08	(40)
Numbe	er of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40)1.	12 / 12-	1.00	(,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
											<u> </u>	l		
1 \//-	ater heat	ing one	av roqui	iromont:								kWh/ye	or:	
- 1 . vvc	ater rieat	ing ener	gy requi	nement.								KVVII/ y C	<i>-</i>	
	ned occu								_			34		(42)
	A > 13.9 A £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
		,	ater usac	ne in litre	es ner da	av Vd av	erage =	(25 x N)	+ 36		00	0.79		(43)
	_			•	•		designed t	` ,		se target o		1.79		(43)
not more	e that 125	litres per p	person per	day (all w	ater use, l	hot and co	old)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)					'	
(44)m=	98.77	95.17	91.58	87.99	84.4	80.81	80.81	84.4	87.99	91.58	95.17	98.77		
Cnora.	contont of	hat water	used sel	outotod m	anthly 1	100 × Vd *		Tm / 2600			m(44) ₁₁₂ =		1077.45	(44)
-				i		·	m x nm x D ı	1		,			ſ	
(45)m=	146.47	128.1	132.19	115.25	110.58	95.42	88.42	101.47	102.68	119.66	130.62	141.85		_
If instan	taneous w	ater heatii	na at point	of use (no	o hot water	r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.71	(45)
		19.22		17.29		· ·				17.05	10.50	24.20		(46)
(46)m= Water	21.97 storage		19.83	17.29	16.59	14.31	13.26	15.22	15.4	17.95	19.59	21.28		(40)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
•		,		•) litres in							` '
	•	•			_		neous co	` '	ers) ente	er '0' in (47)			
	storage			•					·		•			
a) If m	nanufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	y lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
,	nanufact			-										
	ater stora	-			e 2 (kWl	h/litre/da	ay)				0.	02		(51)
I+ 0000	munity h	_		on 4.3									1	/== ·
	a factor		hla 0-								1 1	00		(50)
Volum	e factor			2h							-	03		(52)
Volum Tempe	erature fa	actor fro	m Table					(47) - (51)	(50)	50)	0	.6		(53)
Volum Tempe Energy		actor fro m water	m Table storage		ear			(47) x (51)) x (52) x (53) =	1.			

Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	1 7)m = (56)	n where (H11) is fro	n Append	l ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (an	nual) fro	m Table	3							0		(58)
Primary circui	•	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter			-	-	-	-	-	-	-		
(64)m= 201.74	178.03	187.47	168.74	165.86	148.92	143.7	156.74	156.17	174.94	184.11	197.12		
	•						Outp	out from w	ater heate	r (annual)₁	12	2063.55	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	_
(65)m= 92.92	82.54	88.17	04.44	00.00	74.50	70.00	- ` 	-	-``	<u> </u>	<u> </u>	1	
· /	02.0.	00.17	81.11	80.99	74.52	73.62	77.96	76.94	84.01	86.23	91.39		(65)
` '	<u> </u>				!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57)	m in calc	culation of	of (65)m	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain	m in calc ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(65)
include (57) 5. Internal g	m in cald	culation of Table 5	of (65)m and 5a	only if c	!	<u> </u>	<u> </u>	<u> </u>	ļ	<u> </u>	ļ	eating	(65)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03	m in calc ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m and 5a ts Apr 117.03	only if c : : : : : : : : : : : : : : : : : : :	ylinder is Jun 117.03	Jul 117.03	Aug 117.03	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains	m in calc	Expression of the control of the con	of (65)m and 5a ts Apr 117.03	only if constant of the consta	Jun 117.03	Jul 117.03 r L9a), a	Aug 117.03	Sep 117.03	Oct	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42	m in calc	Table 5 5), Wat Mar 117.03 ted in Ap	of (65)m and 5a ts Apr 117.03 ppendix 10.07	May 117.03 L, equati 7.53	Jun 117.03 ion L9 o	Jul 117.03 r L9a), a	Aug 117.03 Iso see	Sep 117.03 Table 5	Oct 117.03	om com	munity h	eating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 ted in Ap 13.3 ulated in	of (65)m and 5a ts Apr 117.03 ppendix 10.07 Append	only if c May 117.03 L, equati 7.53 dix L, eq	Jun 117.03 ion L9 o 6.36 uation L	Jul 117.03 r L9a), a 6.87	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 Dissee Ta	Oct 117.03	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov	Dec	eating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga	m in calc	Evaluation of Table 5 E 5), Wat Mar 117.03 Ited in Ap 13.3 Ulated in 203.32	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82	only if c May 117.03 L, equati 7.53 dix L, eq 177.31	Jun 117.03 ion L9 o 6.36 uation L 163.66	Jul 117.03 r L9a), a 6.87 13 or L1 154.55	Aug 117.03 Iso see 8.93 3a), also	Sep 117.03 Table 5 11.98 See Ta	Oct 117.03 15.21 ble 5 169.31	Nov 117.03	Dec 117.03	eating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 Append 191.82 opendix 34.7	May 117.03 L, equati 7.53 dix L, eq 177.31 L, equat	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ains (calc 208.73 s (calcula 34.7 ns gains	ted in Apulated in	of (65)m 5 and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7	only if construction in the construction in th	Jun 117.03 ion L9 o 6.36 uation L 163.66 tion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0	ted in Apulated in	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a)	Aug 117.03 Iso see 8.93 3a), also 152.4	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table	Oct 117.03 15.21 ble 5 169.31 5	Nov 117.03 17.76	Dec 117.03 18.93	eating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. e	m in calc ains (see ns (Table Feb 117.03 (calcular 16.36 ains (calcular 208.73 s (calcular 34.7 ns gains 0	ted in Apulated in	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 iion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ins (calc 208.73 s (calcula 34.7 ns gains 0 vaporatio -93.62	ted in Ap 203.32 Ited in Ap 203.32 Ited in Ap (Table 5 0 on (negat	of (65)m ts Apr 117.03 ppendix 10.07 Appendix 191.82 ppendix 34.7 5a) 0	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7	Nov 117.03 17.76 183.82	Dec 117.03 18.93 197.47 34.7	eating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in Ap 14.7 (Table 5 0 n (negation 5)	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0	Nov 117.03 17.76 183.82 34.7	Dec 117.03 18.93 197.47 0	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 tins (calc 208.73 s (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m s and 5a ts Apr 117.03 opendix 10.07 n Append 191.82 opendix 34.7 5a) 0 tive valu	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -93.62 Water heating (72)m= 124.9 Total internal	m in calc ains (see ains (Table Feb 117.03 (calcula 16.36 ains (calcula 208.73 c (calcula 34.7 as gains 0 vaporatio -93.62 gains (T 122.82 gains =	culation of Table 5 25), Wat Mar 117.03 ted in Ap 13.3 ulated in 203.32 uted in Ap 34.7 (Table 5 0 on (negation -93.62) Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 of 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62 103.5 (66)	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7 0 -93.62	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7 0	Sep 117.03 Table 5 11.98 See Ta 157.81 Dee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62 112.92 (70)m + (7	Nov 117.03 17.76 183.82 34.7 0 -93.62 119.76	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal g Metabolic gain Jan (66)m= 117.03 Lighting gains (67)m= 18.42 Appliances ga (68)m= 206.58 Cooking gains (69)m= 34.7 Pumps and fa (70)m= 0 Losses e.g. ex (71)m= -93.62 Water heating (72)m= 124.9	m in calc ains (see ns (Table Feb 117.03 (calcula 16.36 ins (calcula 34.7 ns gains 0 /aporatio -93.62 gains (T 122.82 gains =	ted in Ap 13.3 ulated in 203.32 ted in Ap 13.7 (Table 5 0 n (negat -93.62 Table 5) 118.51	of (65)m and 5a ts Apr 117.03 opendix 10.07 Appendix 191.82 opendix 34.7 5a) 0 tive valu -93.62	only if construction only if c	Jun 117.03 ion L9 o 6.36 uation L 163.66 ion L15 34.7 0 le 5) -93.62	Jul 117.03 r L9a), a 6.87 13 or L1 154.55 or L15a) 34.7	Aug 117.03 Iso see 8.93 3a), also 152.4), also se 34.7	Sep 117.03 Table 5 11.98 See Ta 157.81 ee Table 34.7	Oct 117.03 15.21 ble 5 169.31 5 34.7 0 -93.62	Nov 117.03 17.76 183.82 34.7 0	Dec 117.03 18.93 197.47 0 -93.62 122.83	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	x	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	x	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	X	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	x	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	x	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79]	0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79]	0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67]	0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	x	62.67]	0.24	X	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	x	85.75]	0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	x	85.75]	0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	x	106.25]	0.24	X	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25]	0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01]	0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15]	0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	x	104.39]	0.24	X	0.7	=	66.97	(79)

Courthweaters						. —						— ()
Southwest _{0.9x} 0.77	X	0.6	55		04.39	<u> </u>	0.24	X	0.7	=	7.9	(79)
Southwest _{0.9x} 0.77	X	5.5	51	x 9	2.85	<u> </u>	0.24	X	0.7	=	59.56	(79)
Southwest _{0.9x} 0.77	X	0.6	35	x g	2.85		0.24	x	0.7	=	7.03	(79)
Southwest _{0.9x} 0.77	x	5.5	51	x 6	9.27		0.24	X	0.7	=	44.43	(79)
Southwest _{0.9x} 0.77	X	0.6	S5	× 6	9.27		0.24	x	0.7	=	5.24	(79)
Southwest _{0.9x} 0.77	X	5.5	51	X 4	14.07		0.24	x	0.7	=	28.27	(79)
Southwest _{0.9x} 0.77	X	0.6	S5	X 4	4.07		0.24	x	0.7		3.34	(79)
Southwest _{0.9x} 0.77	X	5.5	51	x 3	31.49		0.24	x	0.7	=	20.2	(79)
Southwest _{0.9x} 0.77	X	0.6	35	x 3	31.49		0.24	x	0.7	=	2.38	(79)
Solar gains in watts, ca	lculated	for eacl	h month			(83)m = S	um(74)m .	(82)m			i	
(83)m= 45.33 83.51	130.97	190.29	238.71	248.23	234.64	196.79	151.24	96.8	55.44	38.05		(83)
Total gains – internal a	nd solar	(84)m =	= (73)m -	+ (83)m	, watts						i	
(84)m= 453.33 489.52	524.22	562.95	590.51	579.86	553.11	521.02	485.99	452.34	434.89	435.38		(84)
7. Mean internal temp	erature ((heating	season)								
Temperature during h	eating p	eriods ir	n the livii	ng area	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisation factor for ga	ains for li	iving are	ea, h1,m	(see Ta	ıble 9a)		, ,					
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1 1	0.99	0.98	0.92	0.78	0.61	0.66	0.89	0.98	1	1		(86)
` '			L T4 /5		no 2 to 7	l Tabl	- 0-1		<u> </u>			
Mean internal tempera (87)m= 19.84 19.95	20.16	20.46	20.74	20.93	20.99	20.98	20.85	20.5	20.12	19.82		(87)
` '					l			20.5	20.12	19.02		(01)
Temperature during h			i		1					•	1	(22)
(88)m= 20 20	20	20.02	20.02	20.03	20.03	20.03	20.03	20.02	20.01	20.01		(88)
Utilisation factor for ga	ins for r	est of d	welling,	h2,m (se	e Table	9a)						
(89)m= 1 1	0.99	0.97	0.89	0.69	0.48	0.54	0.83	0.97	0.99	1		(89)
Mean internal tempera	ature in t	the rest	of dwelli	na T2 (f	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18.45 18.61	18.92	19.36	19.75	19.98	20.02	20.02	19.9	19.43	18.88	18.43		(90)
			Į.	<u> </u>		l	f	LA = Livir	ng area ÷ (4	4) =	0.26	(91)
Many internal towns	· · · · · · · / · · ·	41	ala akwal	II:\	I A T4	. (4 - 4)	A) TO					
Mean internal tempera								40.74	100	40.70		(92)
(92)m= 18.81 18.96	19.25	19.65	20.01	20.23	20.28	20.27	20.15	19.71	19.2	18.79		(92)
Apply adjustment to th	19.25	19.65	20.01	20.23	20.28	4e, whe	20.15	19.71	19.2	18.79		(93)
` '		19.00	20.01	20.23	20.20	20.27	20.15	19.71	19.2	16.79		(93)
8. Space heating requ		nn a ratiu	ro obtoin	ad at at	on 11 of	Table O	o oo tho	tTim /	76\m an	d ro colo	vuloto	
Set Ti to the mean into the utilisation factor fo		•		ied at St	ерттог	rable 9	o, so ma	t 11,111=(76)III an	u re-caic	uiale	
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for ga			· · ·	!		<u> </u>	· ·		1			
(94)m= 1 0.99	0.99	0.96	0.89	0.71	0.52	0.57	0.84	0.97	0.99	1		(94)
Useful gains, hmGm ,	W = (94)	l)m x (84	4)m						•			
(95)m= 451.43 486.15	516.68	540.75	523.21	413.46	285.5	297.27	406.34	437.8	431.39	433.9		(95)
Monthly average exter	nal tem	perature	from Ta	able 8		•			•	•	1	
(96)m= 4.3 4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mea	n intern	al tempe	erature,	Lm , W =	- =[(39)m :	x [(93)m	– (96)m]	•		•	
(97)m= 1182.88 1143.39	1033.77	861.04	664.04	444.04	289.93	304.65	479.42	727.84	971.82	1177.62		(97)
			l	1					1			

Space heating	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95	5)m] x (4 ⁻	1)m			
(98)m= 544.2	441.67	384.71	230.61	104.78	0	0	0	0	215.79	389.11	553.33		_
							Tota	l per year	(kWh/year) = Sum(9	08)15,912 =	2864.18	(98)
Space heating	g require	ement in	kWh/m²	²/year								38.67	(99)
8c. Space co	oling red	quiremer	nt										
Calculated fo	r June, c	July and	August.	See Tal	ole 10b	,	,		,				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	e Lm (ca l 0	lculated 0	using 2		nal temp	583.63	and exte	ernal ter			-		(100)
(100)m= 0 Utilisation fac		<u> </u>	U	0	741.37	583.63	597.87	0	0	0	0		(100)
(101)m= 0	0	0	0	0	0.85	0.92	0.89	0	0	0	0		(101)
Useful loss, h	ımLm (V	<u> </u>	<u> </u>	(101)m		<u> </u>							. ,
(102)m= 0	0	0	0	0	628.97	534.61	533.86	0	0	0	0		(102)
Gains (solar	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m= 0	0	0	0	0	751.99	719.24	682.78	0	0	0	0		(103)
Space coolin	• ,				lwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m]x	(41)m	
set (104)m to (104)m= 0	0	0	0	0	88.58	137.36	110.8	0	0	0	0		
(,								<u> </u>	l = Sum(=	336.73	(104)
Cooled fractio	n								cooled	,	4) =	0.6	(105)
Intermittency f	actor (Ta	able 10b							1				_
(106)m= 0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		٦
Space cooling	requirer	ment for	month -	· (104)m	v (105)	√ (106)r	m	I ota	I = Sum(104)	= [0	(106)
(107)m= 0	0	0	0	0	13.31	20.63	16.64	0	0	0	0		
` '	l	l	I	I		<u> </u>		Tota	l = Sum(107)	=	50.58	(107)
Space cooling	requirer	ment in k	«Wh/m²/	year				(107) ÷ (4) =		-	0.68	(108)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme				. ,		L		
This part is us	ed for sp	ace hea	iting, spa	ace cooli	ing or wa	ater heat	ting prov	ided by	a comm	unity scl	neme		_
Fraction of spa	ace heat	from se	condary	/supplen	nentary l	heating ((Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community sincludes boilers, I	-								up to four	other heat	sources; th	e latter	_
Fraction of he				3010 170GL 1	iom power	otationo.	0007.ppo/	Taix O.				0.13	(303a)
Fraction of co	mmunity	heat fro	m heat s	source 2							Ī	0.87	(303b)
Fraction of total	al space	heat fro	m Comn	nunity C	HP				(3	02) x (303	sa) =	0.13	(304a)
Fraction of total	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	3b) =	0.87	(304b)
Factor for con	trol and	charging	method	ا (Table ا	4c(3)) fo	r commı	unity hea	iting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	12c) for (commun	ity heatii	ng syste	m				Ī	1.05	(306)
Space heatin	g										_	kWh/yea	 r
Annual space	heating	requiren	nent									2864.18	
Space heat fro	om Comr	munity C	HP					(98) x (3	04a) x (30	5) x (306)	=	390.96	(307a)
											_		_

Space heat from heat source 2		(98) x (304b) x	(305) x (306) =	2616.43	(307b)			
Efficiency of secondary/supplemen	tary heating system in % (rom Table 4a or Appe	ndix E)	0	(308			
Space heating requirement from se	econdary/supplementary sy	ystem (98) x (301) x	100 ÷ (308) =	0	(309)			
Water heating					_			
Annual water heating requirement				2063.55				
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) x	(305) x (306) =	281.67	(310a)			
Water heat from heat source 2		(64) x (303b) x	1885.05	(310b)				
Electricity used for heat distribution	1	0.01 × [(307a)(30	0.01 × [(307a)(307e) + (310a)(310e)] =					
Cooling System Energy Efficiency I	Ratio			4.73	(314)			
Space cooling (if there is a fixed co	ooling system, if not enter 0) = (107) ÷ (314) =	10.71	(315)			
Electricity for pumps and fans withi mechanical ventilation - balanced,		m outside		158.57	(330a)			
warm air heating system fans				0	(330b)			
pump for solar water heating				0	(330g)			
Total electricity for the above, kWh	/year	=(330a) + (330	0b) + (330g) =	158.57	(331)			
Energy for lighting (calculated in Ap	opendix L)			325.25	(332)			
Electricity generated by PVs (Appe	ndix M) (negative quantity)	1		-158.19	(333)			
Electricity generated by wind turbin	e (Appendix M) (negative	quantity)		0	(334)			
12b. CO2 Emissions – Community	heating scheme							
Electrical efficiency of CHP unit	<u> </u>				_			
				30.6	(361)			
Heat efficiency of CHP unit				30.6 63	(361)			
Heat efficiency of CHP unit		Energy	Emission factor	63	_			
Heat efficiency of CHP unit		Energy kWh/year	Emission factor kg CO2/kWh	63	_			
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =			63 Emissions	_			
	(307a) × 100 ÷ (362) = -(307a) × (361) ÷ (362) =	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)			
Space heating from CHP)		kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)			
Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year 620.57	0.22 0.52	63 Emissions kg CO2/year 134.04 -98.56	(362) (363) (364)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	kWh/year 620.57	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01	(362) (363) (364) (365)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	620.57 × 189.9 × 447.1 × 136.81 ×	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7	(362) (363) (364) (365) (366)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.22 0.52 0.652 0.66) for the second fue	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5	(362) (363) (364) (365) (366) (367b)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us $(307b)$	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 = 1005.5	(362) (363) (364) (365) (366) (367b) (368)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) If the systems	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5 26.85	(362) (363) (364) (365) (366) (367b) (368) (372)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) If the systems (secondary)	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 = 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5 26.85 1093.41	(362) (363) (364) (365) (366) (367b) (368) (372) (373)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications.	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In this systems (307b) (3	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 = 0.52 = 0.52 = 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5 26.85 1093.41	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communication co	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In this systems (307b) In the systems (3	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 = 0.52 = 0.52 = 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5 26.85 1093.41	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)			
Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with space heating CO2 associated with water from im Total CO2 associated with space as	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP use (307b) In the control of t	kWh/year 620.57	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52 = 0.52	63 Emissions kg CO2/year 134.04 -98.56 96.57 -71.01 96.7 1005.5 26.85 1093.41 0 1093.41	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375) (376)			

CO2 associated with electricity for lighting (332))) x 168.8 (379)0.52 Energy saving/generation technologies (333) to (334) as applicable x 0.01 = Item 1 (380) 0.52 -82.1 Total CO2, kg/year sum of (376)...(382) = (383) 1267.97 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ 17.12 (384)El rating (section 14) (385)85.73

		l lser I	Details:							
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363		
Software Name:	Stroma FSAP 2012		Softwa					on: 1.0.4.10		
	F	Property	Address	: Flat 3-2	2-Green					
Address: 1. Overall dwelling dime	onsions:									
1. Overall awelling unite	511310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)	
Basement				(1a) x		2.6	(2a) =	197.76	(3a)	
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.06	(4)			•		_	
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	197.76	(5)	
2. Ventilation rate:										
	main seconda heating heating	ry	other		total			m³ per hou	ır	
Number of chimneys	0 + 0	7 + [0	=	0	X 4	40 =	0	(6a)	
Number of open flues	0 + 0	-	0	Ī = Ī	0	x 2	20 =	0	(6b)	
Number of intermittent fa	ins				0	x ²	10 =	0	(7a)	
Number of passive vents	;			Ī	0	x ²	10 =	0	(7b)	
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)	
				_						
	(0.) (0.)	_	<i>(</i> _)	_				nanges per ho	_	
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, proced			continue fr	0 rom (9) to		÷ (5) =	0	(8)	
Number of storeys in the		.a to (/ ,			o (o) to	(1.0)		0	(9)	
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)	
	.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)	
deducting areas of openi		o irie grea	iter wall are	a (aner						
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)	
If no draught lobby, en								0	(13)	
Window infiltration	s and doors draught stripped		0.25 - [0.2	P x (14) ÷ 1	1001 =			0	(14)	
Infiltration rate			(8) + (10)	. ,	-	+ (15) =		0	(15) (16)	
	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)	
If based on air permeabil	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	vise (18) = ((16)				0.15	(18)	
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed				
Number of sides sheltere Shelter factor	ed .		(20) = 1 -	[0.075 x (²	19)] =			0.78	(19) (20)	
Infiltration rate incorporate	ting shelter factor		(21) = (18					0.12	(21)	
Infiltration rate modified f	•							02	` ′	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Monthly average wind sp	peed from Table 7							_		
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7			
Wind Factor (22a)m = (2.	2)m ÷ 4									
<u> </u>	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18			
	• •	_		_	_	-		-		

Adjusted infiltration	n rate (allowi	ng for sh	elter an	d wind sp	peed) =	(21a) x	(22a)m					
0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effective	_	rate for t	he appli	cable cas	se			•	•	•	<i>-</i>	
If mechanical v		andiv N (2)	3h) - (23a	a) × Emy (e	guation (I	VSV) other	wise (23h	n) = (23a)			0.5	(23a)
If balanced with he)) = (25a)			0.5	(23b)
a) If balanced n	-	-	_					2h\m + 1	(23h) v [1 _ (23c)	76.5) ÷ 1001	(23c)
	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25) - 100]]	(24a)
b) If balanced n	nechanical ve	entilation	without	heat rec	overv (N			 2b)m + (′23b)	ļ	_	
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole hous	se extract ver 0.5 × (23b), t		-	-				.5 × (23l	b)		J	
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural ver if (22b)m =	ntilation or wh							0.5]	•	•	_	
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air cha	ange rate - er	nter (24a	or (24k	o) or (24c) or (24	d) in box	(25)	•			_	
(25)m= 0.27 0	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losses a	nd heat loss i	paramete	er:									
ELEMENT	Gross area (m²)	Openin m	gs	Net Are A ,m		U-valu W/m2		A X U (W/		k-valu kJ/m²·		A X k kJ/K
Doors				2.6	х	1.2	=	3.12				(26)
Windows Type 1				3.26	x1	/[1/(1.2)+	0.04] =	3.73				(27)
Windows Type 2				3.95	x1	/[1/(1.2)+	0.04] =	4.52				(27)
Windows Type 3				5.51	x1	/[1/(1.2)+	0.04] =	6.31				(27)
Windows Type 4				0.65	x1	/[1/(1.2)+	0.04] =	0.74				(27)
Walls Type1	38.14	20.58	3	17.56	x	0.15	=	2.63				(29)
Walls Type2	23.92	2.6		21.32	x	0.15	=	3.2			$\neg \vdash$	(29)
Walls Type3	5.95	0		5.95	X	0.15	=	0.89				(29)
Walls Type4	29.51	0		29.51	x	0.15		4.43				(29)
Roof	20.45	0		20.45	X	0.15	=	3.07				(30)
Total area of elem	nents, m²			117.97								(31)
Party wall				12.35	x	0	-	0				(32)
Party floor				76.06							\neg	(32a)
Party ceiling				55.61	$\overline{\Box}$				Ī			(32b)
* for windows and roo ** include the areas o					ted using	formula 1/	[(1/U-valı	ue)+0.04] a	as given in	paragrapi	h 3.2	<u></u>
Fabric heat loss,	W/K = S (A x)	U)				(26)(30)	+ (32) =				40.9	(33)
Heat capacity Cm	$I = S(A \times k)$						((28).	(30) + (3	2) + (32a).	(32e) =	26201.4	45 (34)
	,											
Thermal mass pa	, ,	o = Cm ÷	· TFA) ir	n kJ/m²K			Indica	ative Value	e: Medium		250	(35)

can be used insi	ead of a de	tailed calci	ulation.										
Thermal bridge	ges : S (L	x Y) cal	culated (using Ap	pendix I	K						23.27	(36)
if details of therr	,	,			•								` ′
Total fabric h	eat loss							(33) +	(36) =			64.17	(37)
Ventilation he	eat loss ca	alculated	monthly	у				(38)m	= 0.33 × (25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.34	17.15	16.96	16.01	15.82	14.88	14.88	14.69	15.25	15.82	16.2	16.58		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 81.51	81.32	81.13	80.18	79.99	79.04	79.04	78.85	79.42	79.99	80.37	80.75		
Heat loss par	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	80.13	(39)
(40)m= 1.07	1.07	1.07	1.05	1.05	1.04	1.04	1.04	1.04	1.05	1.06	1.06		
Number of da	ays in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.05	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
	•	•	•		•	•	•		•	•	•	•	
4. Water he	ating ene	rgy requi	irement:								kWh/y	ear:	
												1	
Assumed occ if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.38		(42)
Annual avera	•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).82	1	(43)
Reduce the annual track to the state of the	_				_	_	to achieve	a water us	se target o	f		J	
not more that 12	1			aler use, r	TOL AND CO	•	1		<u> </u>		1	1	
Jan Hot water usage	Feb	Mar Mar	Apr	May	Jun	Jul Toble 10 Y	Aug	Sep	Oct	Nov	Dec		
	·		i		i		· <i>′</i>					1	
(44)m= 99.9	96.27	92.63	89	85.37	81.73	81.73	85.37	89	92.63	96.27	99.9	4000.0	7(44)
Energy content	of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1089.8	(44)
(45)m= 148.15	129.57	133.7	116.57	111.85	96.52	89.44	102.63	103.86	121.03	132.12	143.47		
									Total = Su	m(45) ₁₁₂ =	=	1428.9	(45)
If instantaneous	water heati	ng at point	of use (no	not water	r storage),	enter 0 in	boxes (46)) to (61)				1	
(46)m= 22.22	19.44	20.06	17.48	16.78	14.48	13.42	15.39	15.58	18.16	19.82	21.52		(46)
Water storag Storage volui) includin	na anv sa	olar or W	/WHRS	storage	within sa	me ves	sel		0	1	(47)
If community	, ,		•			_					0		()
Otherwise if r	_			-			. ,	ers) ente	er '0' in (47)			
Water storag	e loss:		,					·	·	•			
a) If manufac	cturer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0]	(49)
Energy lost fr		_	-				(48) x (49)	=		1	10]	(50)
b) If manufac			-									1	(=4)
Hot water sto	_			ı c ∠ (KVVI	n/ntre/da	ay <i>)</i>				0.	.02	J	(51)
Volume facto	_									1.	.03	1	(52)
Temperature	factor fro	m Table	2b								0.6	1	(53)

Energy lost from water storage, kWh/year	(47) x (51) x (52)) x (53) =	1.00	3		(54)
Enter (50) or (54) in (55)		L	1.03	3		(55)
Water storage loss calculated for each month	$((56)m = (55) \times ($	(41)m				
	32.01 32.01 30.9		30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H1	[11)] ÷ (50), else (57)m =	(56)m where (H	11) is from	n Appendix	Н	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 3	32.01 32.01 30.9	98 32.01	30.98	32.01		(57)
Primary circuit loss (annual) from Table 3			0			(58)
Primary circuit loss calculated for each month (59)m = (58	, , ,					
(modified by factor from Table H5 if there is solar water						
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 2	23.26 23.26 22.5	51 23.26	22.51	23.26		(59)
Combi loss calculated for each month (61)m = (60) ÷ 365	× (41)m	_				
(61)m= 0 0 0 0 0 0	0 0 0	0	0	0		(61)
Total heat required for water heating calculated for each r	month (62)m = 0.85	5 × (45)m + (4	16)m + (5	57)m + (59)m + (61)m	
(62)m= 203.42 179.5 188.98 170.06 167.13 150.01 1	144.71 157.91 157.	.35 176.31	185.61	198.75		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative	quantity) (enter '0' if no	solar contributio	n to water	heating)		
(add additional lines if FGHRS and/or WWHRS applies, se	see Appendix G)					
(63)m= 0 0 0 0 0 0	0 0 0	0	0	0		(63)
Output from water heater						
(64)m= 203.42 179.5 188.98 170.06 167.13 150.01 1	144.71 157.91 157.	.35 176.31	185.61	198.75		_
·	Output fror	m water heater (annual)11	12	2079.74	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 ×	(45)m + (61)ml + 0	8 x [(46)m +	(57)m +	- (59)m 1		
, , , , , , , , , , , , , , , , , , ,	(- /)] -	x [()	(,	(00)]		
	73.96 78.35 77.3	- 	86.72	91.93		(65)
	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a):	73.96 78.35 77.3	33 84.47	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7 include (57)m in calculation of (65)m only if cylinder is in	73.96 78.35 77.3	84.47 st water is fro	86.72	91.93	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun	73.96 78.35 77.3 In the dwelling or ho	84.47 st water is fro	86.72 m comm	91.93 nunity he	ating	(65)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.</td><td>33 84.47 ot water is fro</td><td>86.72 m comm</td><td>91.93 nunity he</td><td>ating</td><td></td></t<>	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.	33 84.47 ot water is fro	86.72 m comm	91.93 nunity he	ating	
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119.	84.47 ot water is fro	86.72 m comm	91.93 nunity he	ating	
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119. 9a), also see Table 7.01 9.12 12.2	90 Oct 19 119.19 9 5 5 24 15.54	86.72 m comm Nov 119.19	91.93 nunity he Dec 119.19	ating	(66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13	73.96 78.35 77.3 In the dwelling or ho Jul Aug Se 119.19 119.19 119. 9a), also see Table 7.01 9.12 12.2	9 Oct 19 119.19 9 5 24 15.54 Table 5	86.72 m comm Nov 119.19	91.93 nunity he Dec 119.19	ating	(66)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling</td><td>84.47 ot water is fro ep Oct 19 119.19 25 5 24 15.54 Table 5 19 172.93</td><td>86.72 m comm Nov 119.19 18.14</td><td>91.93 nunity he Dec 119.19</td><td>ating</td><td>(66) (67)</td></t<>	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling	84.47 ot water is fro ep Oct 19 119.19 25 5 24 15.54 Table 5 19 172.93	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19	ating	(66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling from the dwell	9 Oct 19 119.19 9 5 5 24 15.54 Table 5 19 172.93 able 5	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 19.19 1	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for hold for the dwelling for hold for the dwelling for hold for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for the dwelling for hold for the dwelling	9p Oct 19 119.19 9 5 5 24 15.54 Table 5 19 172.93 able 5	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19	ating	(66) (67)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 3	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for the dwe	33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92	Nov 119.19 18.14 187.76 34.92	91.93 nunity he Dec 119.19 19.33 201.7 34.92	ating	(66) (67) (68) (69)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 <t< td=""><td>73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling from the dwell</td><td>33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92</td><td>86.72 m comm Nov 119.19 18.14</td><td>91.93 nunity he Dec 119.19 19.33 201.7</td><td>ating</td><td>(66) (67) (68)</td></t<>	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling or hold from the dwelling from the dwell	33 84.47 ot water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92	86.72 m comm Nov 119.19 18.14	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling fo	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7	ating	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 34.9	73.96 78.35 77.3 In the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling or hold for the dwelling for the dwe	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7 34.92	ating	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 119.19 1 Lighting gains (calculated in Appendix L, equation L9 or L (67)m= 18.81 16.71 13.59 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 34.	73.96	9p Oct 19 119.19 9 5 5 19 172.93 14.92 0 0 35 -95.35	Nov 119.19 18.14 187.76 34.92 0	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0	ating	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun (66)m= 119.19 10.29 7.69 6.49 Appliances gains (calculated in Appendix L, equation L13 (68)m= 211.01 213.2 207.68 195.93 181.11 167.17 1 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.92 3	73.96	33 84.47 of water is from the set of the set	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 7.55 Include (57)m in calculation of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the control of (65)m only if cylinder is in the cyli	73.96	33 84.47 of water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92 0 35 -95.35 7.4 113.53 m + (70)m + (71)	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45 mm + (72)mm	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70) (71)
(65)m= 93.48 83.02 88.68 81.55 81.41 74.89 75 include (57)m in calculation of (65)m only if cylinder is in the state of th	73.96	33 84.47 of water is fro ep Oct 19 119.19 e 5 24 15.54 Table 5 19 172.93 able 5 92 34.92 0 35 -95.35 7.4 113.53 m + (70)m + (71)	Nov 119.19 18.14 187.76 34.92 0 -95.35 120.45 mm + (72)mm	91.93 nunity he Dec 119.19 19.33 201.7 34.92 0 -95.35	ating	(66) (67) (68) (69) (70)

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Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation: Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	X	3.26	x	11.28	x	0.24	x	0.7] =	8.56	(75)
Northeast _{0.9x} 0.77	X	3.95	x	11.28	x	0.24	x	0.7	=	10.38	(75)
Northeast 0.9x 0.77	X	3.26	х	22.97	x	0.24	x	0.7	=	17.43	(75)
Northeast _{0.9x} 0.77	x	3.95	x	22.97	x	0.24	x	0.7] =	21.12	(75)
Northeast _{0.9x} 0.77	x	3.26	x	41.38	x	0.24	x	0.7	=	31.41	(75)
Northeast 0.9x 0.77	X	3.95	х	41.38	x	0.24	x	0.7	=	38.06	(75)
Northeast _{0.9x} 0.77	X	3.26	x	67.96	x	0.24	x	0.7	=	51.58	(75)
Northeast _{0.9x} 0.77	X	3.95	x	67.96	x	0.24	x	0.7	=	62.5	(75)
Northeast _{0.9x} 0.77	X	3.26	x	91.35	x	0.24	x	0.7	=	69.34	(75)
Northeast _{0.9x} 0.77	X	3.95	x	91.35	x	0.24	x	0.7	=	84.02	(75)
Northeast _{0.9x} 0.77	x	3.26	x	97.38	x	0.24	x	0.7	=	73.92	(75)
Northeast _{0.9x} 0.77	x	3.95	x	97.38	x	0.24	x	0.7	=	89.57	(75)
Northeast _{0.9x} 0.77	x	3.26	x	91.1	x	0.24	x	0.7	=	69.15	(75)
Northeast _{0.9x} 0.77	x	3.95	x	91.1	x	0.24	x	0.7	=	83.79	(75)
Northeast _{0.9x} 0.77	X	3.26	x	72.63	x	0.24	x	0.7	=	55.13	(75)
Northeast _{0.9x} 0.77	x	3.95	x	72.63	x	0.24	x	0.7	=	66.8	(75)
Northeast _{0.9x} 0.77	x	3.26	x	50.42	x	0.24	x	0.7	=	38.27	(75)
Northeast _{0.9x} 0.77	X	3.95	x	50.42	x	0.24	x	0.7	=	46.37	(75)
Northeast _{0.9x} 0.77	X	3.26	x	28.07	x	0.24	x	0.7	=	21.31	(75)
Northeast _{0.9x} 0.77	X	3.95	x	28.07	x	0.24	x	0.7	=	25.81	(75)
Northeast _{0.9x} 0.77	X	3.26	х	14.2	x	0.24	x	0.7	=	10.78	(75)
Northeast _{0.9x} 0.77	X	3.95	x	14.2	X	0.24	x	0.7	=	13.06	(75)
Northeast _{0.9x} 0.77	x	3.26	x	9.21	x	0.24	x	0.7	=	6.99	(75)
Northeast _{0.9x} 0.77	X	3.95	x	9.21	x	0.24	x	0.7	=	8.47	(75)
Southwest _{0.9x} 0.77	x	5.51	x	36.79		0.24	x	0.7	=	23.6	(79)
Southwest _{0.9x} 0.77	x	0.65	x	36.79		0.24	x	0.7	=	2.78	(79)
Southwest _{0.9x} 0.77	x	5.51	x	62.67		0.24	x	0.7	=	40.2	(79)
Southwest _{0.9x} 0.77	X	0.65	X	62.67		0.24	x	0.7	=	4.74	(79)
Southwest _{0.9x} 0.77	X	5.51	X	85.75		0.24	X	0.7	=	55.01	(79)
Southwest _{0.9x} 0.77	X	0.65	X	85.75		0.24	x	0.7	=	6.49	(79)
Southwest _{0.9x} 0.77	X	5.51	X	106.25		0.24	x	0.7	=	68.16	(79)
Southwest _{0.9x} 0.77	X	0.65	x	106.25		0.24	x	0.7	=	8.04	(79)
Southwest _{0.9x} 0.77	x	5.51	x	119.01]	0.24	x	0.7	=	76.34	(79)
Southwest _{0.9x} 0.77	x	0.65	x	119.01		0.24	x	0.7	=	9.01	(79)
Southwest _{0.9x} 0.77	X	5.51	x	118.15		0.24	x	0.7	=	75.79	(79)
Southwest _{0.9x} 0.77	X	0.65	x	118.15]	0.24	x	0.7	=	8.94	(79)
Southwest _{0.9x} 0.77	X	5.51	x	113.91]	0.24	x	0.7] =	73.07	(79)
Southwest _{0.9x} 0.77	X	0.65	x	113.91]	0.24	x	0.7	=	8.62	(79)
Southwest _{0.9x} 0.77	X	5.51	X	104.39		0.24	X	0.7	=	66.97	(79)

Southwesto.	<u> </u>	X	0.6	35	x	10	04.39			0.24	X	0.7	=	7.9	(79)
Southwesto.	9x 0.77	X	5.5	51	x	9	2.85]		0.24	X	0.7	=	59.56	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	9	2.85			0.24	X	0.7	=	7.03	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	6	9.27]		0.24	X	0.7	=	44.43	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	6	9.27]		0.24	X	0.7	=	5.24	(79)
Southwest _{0.}	9x 0.77	x	5.5	51	x	4	4.07] [0.24	X	0.7	=	28.27	(79)
Southwesto.	9x 0.77	x	0.6	S5	x	4	4.07]		0.24	X	0.7	=	3.34	(79)
Southwest _{0.}	9x 0.77	х	5.5	51	x	3	1.49]		0.24	x	0.7	=	20.2	(79)
Southwest _{0.}	9x 0.77	x	0.6	35	x	3	1.49			0.24	x	0.7	=	2.38	(79)
Solar gains	in watts, c	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 45.3	33 83.51	130.97	190.29	238.71	24	18.23	234.64	196.	.79	151.24	96.8	55.44	38.05		(83)
Total gains	– internal a	and solar	(84)m =	= (73)m ·	+ (8	33)m	, watts					_		,	
(84)m= 459.	55 495.72	530.19	568.54	595.68	58	34.66	557.68	525.	.64	490.82	457.56	440.55	441.4		(84)
7. Mean ir	ternal tem	perature	(heating	season)										
Temperati	ure during l	neating p	eriods ir	n the livii	ng a	area f	from Tab	ole 9,	, Th	1 (°C)				21	(85)
Utilisation	factor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)								
Ja	n Feb	Mar	Apr	May	,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.98	0.92	C).78	0.6	0.6	6	0.89	0.98	1	1		(86)
Mean inte	rnal tempe	rature in	living ar	ea T1 (fo	יסווכי	w ste	ns 3 to 7	in T	able	e 9c)		•		•	
(87)m= 19.8		20.18	20.48	20.75	_	0.94	20.99	20.9	$\overline{}$	20.86	20.52	20.15	19.85]	(87)
Tomporati	ure during l	noating p	oriode ir	roct of	طس	allina	from To	hla C					1	ı	
(88)m= 20.0		20.03	20.04	20.04	_	0.05	20.05	20.0	_	20.05	20.04	20.04	20.03]	(88)
. ,				<u> </u>				<u> </u>				1	1	l	, ,
	factor for g	1	0.97	welling, 0.89	_	m (se	0.48	<u> </u>	., 1	0.83	0.97	1 0.00	<u> </u>	1	(89)
(33)		0.99						0.5				0.99	1		(09)
	rnal tempe				$\overline{}$								1	1	
(90)m= 18.5	18.67	18.98	19.41	19.79		20	20.05	20.0	04	19.93	19.47	18.93	18.49		(90)
										Ť	LA = Liv	ing area ÷ (4) =	0.26	(91)
Mean inte	rnal tempe	rature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2				-	
(92)m= 18.8	36 19.01	19.28	19.68	20.03	2	0.24	20.29	20.2	28	20.16	19.74	19.24	18.84		(92)
,	stment to t				_				_					1	
(93)m= 18.8		19.28	19.68	20.03	2	0.24	20.29	20.2	28	20.16	19.74	19.24	18.84		(93)
•	neating req														
	ne mean in ion factor f				ed	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=	⊧(76)m an	d re-cald	culate	
Ja		Mar	Apr	May	П	Jun	Jul	Δι	ug	Sep	Oct	Nov	Dec]	
	factor for g		•	ividy	<u>'</u>	ouri	<u> </u>		ug į	ОСР	000	1107	<u> </u>	J	
(94)m= 1		0.99	0.96	0.89	C).71	0.52	0.5	57	0.84	0.97	0.99	1]	(94)
	ns, hmGm	, W = (94	1)m x (8	4)m				l	!			Į	<u>!</u>	I	
(95)m= 457.		522.88	546.7	528.43	41	16.75	287.26	299	9.3	410.53	443.22	437.18	439.99]	(95)
Monthly a	verage exte	ernal tem	perature	from Ta	able	e 8						-1	•		
(96)m= 4.3	3 4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(93	3)m-	- (96)m]			-	
(97)m= 1186	5.76 1147.19	1037.22	864.33	666.56	44	16.01	291.35	306.	.17	481.57	730.92	975.76	1182.11		(97)

Spac	e heating	a require	ement fo	r each m	nonth. k\	Wh/mon	th = 0.02	24 x [(97)m – (95	5)ml x (4 ⁻	1)m			
(98)m=	542.39	439.96	382.66	228.69	102.77	0	0	0	0	214.05	387.78	552.14		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2850.45	(98)
Spac	e heating	g require	ement in	kWh/m²	/year							Ī	37.48	(99)
8c. S	pace cod	oling rec	uiremer	nt								-		
Calcu	lated for	June, c	July and	August.	See Tal	ole 10b	,							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat (100)m=	loss rate	Lm (ca	lculated 0	using 28	o°C inter	nal temp 743.01	584.92	and exte	ernal ter	nperatur 0	e from T	able 10)		(100)
` '	ation fac		ļ	U	U	743.01	364.92	599.29		0	U	U		(100)
(101)m=		0	0	0	0	0.85	0.92	0.9	0	0	0	0		(101)
	ıl loss, h	mLm (V	ı /atts) = ((100)m x	(101)m		<u> </u>			ļ				
(102)m=		0	0	0	0	634.58	538.46	538.26	0	0	0	0		(102)
Gains	s (solar g	gains ca	lculated	for appli	cable we	eather re	gion, se	e Table	10)					
(103)m=		0	0	0	0	759.25	726.17	689.83	0	0	0	0		(103)
	e cooling 04)m to					lwelling,	continu	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] x	c (41)m	
(104)m=		0	0	0	0	89.76	139.66	112.76	0	0	0	0		
			Į			ļ.	!	!	Tota	l = Sum(104)	=	342.18	(104)
	d fraction								f C =	cooled	area ÷ (4	4) =	0.59	(105)
	ittency fa		1	<u> </u>		0.05	0.05	0.05			0			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 Tota	0 = Sum(0	0		7(106)
Space	cooling	requirer	ment for	month =	(104)m	× (105)	× (106)r	m	TOla	ı = Surrı(1 .U.41)	= [0	(106)
(107)m=		0	0	0	0	13.13	20.43	16.49	0	0	0	0		
									Tota	l = Sum(107)	=	50.05	(107)
Space	cooling	requirer	ment in k	(Wh/m²/y	/ear				(107) ÷ (4) =			0.66	(108)
9b. En	ergy req	uiremer	nts – Cor	mmunity	heating	scheme								
	art is use on of spa			• .		•		.	•		unity sch	neme.	0	(301)
	•			-		-	_	(Table T	1) 0 11 11	One		Ĺ		=
	on of spa			•	•	`	•		0.10			Ĺ	1	(302)
	nmunity sc s boilers, h									up to four (other heat	sources; th	ne latter	
	on of hea		_			•							0.13	(303a)
Fraction	on of con	nmunity	heat fro	m heat s	ource 2								0.87	(303b)
Fraction	on of tota	ıl space	heat fro	m Comn	nunity C	HP				(3	02) x (303	a) =	0.13	(304a)
Fraction	on of tota	ıl space	heat fro	m comm	unity he	at sourc	e 2			(3	02) x (303	b) =	0.87	(304b)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r commi	unity hea	ating sys	tem			1	(305)
	ution los				•	. ,,		•	0 ,				1.05	(306)
	heating		,	, •		,	5 - 7 - 10					L	kWh/year	
-	l space l		requiren	nent								[2850.45	7
Space	heat fro	m Comr	munity C	HP					(98) x (3	04a) x (305	5) x (306) :	<u> </u>	389.09	(307a)
												L		_

Space heat from heat source 2					_
		(98) x (304b) >	x (305) x (306) =	2603.88	(307b)
Efficiency of secondary/supplements	ary heating system in % (f	from Table 4a or Appe	ndix E)	0	(308
Space heating requirement from sec	condary/supplementary sy	vstem (98) x (301) x	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2079.74	
If DHW from community scheme: Water heat from Community CHP		(64) x (303a) >	x (305) x (306) =	283.88	(310a)
Water heat from heat source 2		(64) x (303b) x	x (305) x (306) =	1899.84	(310b)
Electricity used for heat distribution		0.01 × [(307a)(30	7e) + (310a)(310e)] =	51.77	(313)
Cooling System Energy Efficiency R	Ratio			4.73	(314)
Space cooling (if there is a fixed coo	oling system, if not enter 0) = (107) ÷ (314	·) =	10.59	(315)
Electricity for pumps and fans within mechanical ventilation - balanced, e	• · · · · · · · · · · · · · · · · · · ·	m outside		162.85	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/y	year	=(330a) + (330	0b) + (330g) =	162.85	(331)
Energy for lighting (calculated in App	pendix L)			332.22	(332)
Electricity generated by PVs (Appen	ndix M) (negative quantity)			-162.5	(333)
Electricity generated by wind turbine	e (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions – Community h	neating scheme				
Electrical efficiency of CHP unit				30.6	(361)
Electrical efficiency of CHP unit Heat efficiency of CHP unit				30.6 63	(361)
·		Energy	Emission factor	63 Emissions	
Heat efficiency of CHP unit	(007.) (000.)	kWh/year	Emission factor	63	(362)
Heat efficiency of CHP unit Space heating from CHP)	(307a) × 100 ÷ (362) =	• • • • • • • • • • • • • • • • • • • •		63 Emissions	
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity	$-(307a) \times (361) \div (362) =$	kWh/year	kg CO2/kWh	63 Emissions kg CO2/year	(362)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ (310a) × 100 ÷ (362) =	kWh/year	0.22	63 Emissions kg CO2/year	(362)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$	617.6 × 188.98 ×	0.22 0.52	63 Emissions kg CO2/year 133.4 -98.08	(362)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$	617.6 × 188.98 × 450.61 ×	0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56	(362) (363) (364) (365)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us	617.6 × 188.98 × 450.61 × 137.89 ×	0.22 0.52 0.52 0.52 0.60 (366) for the second fu	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56	(362) (363) (364) (365) (366)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%)	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us [(307b)	kWh/year 617.6	0.22 0.52 0.52 0.52 0.52 0.52 0.6366) for the second fu	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7	(362) (363) (364) (365) (366) (367b)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2	$-(307a) \times (361) \div (362) =$ $(310a) \times 100 \div (362) =$ $-(310a) \times (361) \div (362) =$ If there is CHP us [(307b)	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.22 0.52 0.22 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7 = 1006	(362) (363) (364) (365) (366) (367b) (368)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) n	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7 = 1006 = 26.87	(362) (363) (364) (365) (366) (367b) (368) (372)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communications	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) n ity systems (secondary)	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7 = 1006 = 26.87 = 1093.96	(362) (363) (364) (365) (366) (367b) (368) (372) (373)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communic CO2 associated with space heating	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) n ity systems (secondary) mersion heater or instanta	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.52 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7 = 1006 = 26.87 = 1093.96 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374)
Heat efficiency of CHP unit Space heating from CHP) less credit emissions for electricity Water heated by CHP less credit emissions for electricity Efficiency of heat source 2 (%) CO2 associated with heat source 2 Electrical energy for heat distribution Total CO2 associated with communic CO2 associated with space heating CO2 associated with water from imm	-(307a) × (361) ÷ (362) = (310a) × 100 ÷ (362) = -(310a) × (361) ÷ (362) = If there is CHP us [(307b) n ity systems (secondary) mersion heater or instanta	kWh/year 617.6	kg CO2/kWh 0.22 0.52 0.52 0.52 0.52 0.52 0.52 0.22 0.52 0.52	63 Emissions kg CO2/year 133.4 -98.08 97.33 -71.56 el 96.7 = 1006 = 26.87 = 1093.96 = 0 = 0	(362) (363) (364) (365) (366) (367b) (368) (372) (373) (374) (375)

CO2 associated with electricity for light	ing	(332))) x	0.52	172.42	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appli	cable	0.52 x 0.01 =	-84.34	(380)
Total CO2, kg/year	sum of (376)(382) =			1272.06	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			16.72	(384)
El rating (section 14)				85.92	(385)

		User D	Notaile:						
A consequently was	Oberia I I a alexa all	USELL		_			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 on: 1.0.4.10	
Software Hame.		Property					VCISIO	ni. 1.0. 4 .10	
Address :									
1. Overall dwelling dime	ensions:								
Dogomont			a(m²)	(4 -)		ight(m)	1 (0-)	Volume(m³	_
Basement				(1a) x	2	2.6	(2a) =	141.28	(3a)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	54.34	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	141.28	(5)
2. Ventilation rate:	main seconda	μι,	other		total			m³ per hou	•
	heating heating	<u> </u>	outer		lotai			ill' per nou	_
Number of chimneys	0 + 0	_ +	0	_ = _	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ans				0	X	10 =	0	(7a)
Number of passive vents	3				0	X ·	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	X 4	40 =	0	(7c)
				-					
				_			Air ch	anges per ho	ur —
	ys, flues and fans = (6a)+(6b)+(0		÷ (5) =	0	(8)
Number of storeys in t	peen carried out or is intended, proced he dwelling (ns)	ea to (17), i	otnerwise (continue ti	om (9) to	(16)		0	(9)
Additional infiltration	ne amamig (ma)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	0.25 for steel or timber frame o	r 0.35 fo	r masonı	y consti	ruction	- ,		0	(11)
	resent, use the value corresponding t	to the great	ter wall are	a (after			!		
deducting areas of openi	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or () 1 (spale	معام (امد	enter ()				0	(12)
If no draught lobby, en	,	7.1 (Scale	<i>5u)</i> , 6136	enter o				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	3		0.25 - [0.2	x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	ise (18) = (16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0 075 ν (*	10\1 –			2	(19)
Infiltration rate incorpora	ting shelter factor		(20) = 1 (21) = (18)		10)] =			0.85	(20)
Infiltration rate modified t			(21) = (10)) X (20) -				0.13	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1	1 3		1	1			
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
		1	•		•		1	ı	
Wind Factor (22a)m = $(2^{23})^{25}$	' , , , , , , , , , , , , , , , , , , ,	0.05	0.00	4	1.00	4.40	140	Ī	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate (allov	ving for sh	elter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effec	_	rate for th	ne appli	cable ca	se						, 	
If mechanica		nondiy N (22	2b) _ (22c	a) v Emy (nguation (NEN othe	muioo (22h	v) = (33a)			0.5	(23a)
	eat pump using Ap)) = (23a)			0.5	(23b)
	heat recovery: eff	-	_					Ol- \ /	005) [4 (00-)	76.5	(23c)
	d mechanical v	entilation (0.25	at recov	ery (MV 0.24	HR) (24)	a)m = (2) 0.24	2b)m + (0.25	23b) × [0.26	1 - (23c)	i ÷ 100] I	(24a)
(24a)m= 0.28	ļ .					<u> </u>	<u> </u>	ļ		0.27	J	(24a)
· -	d mechanical v	entilation of the contraction of	without 0	neat red	covery (i	VIV) (241 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	26)m + (. T 0	23b) ₀	0	1	(24b)
(' ' '											J	(240)
,	ouse extract vents $0.5 \times (23b)$,		•	•				5 x (23h	o)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24c)
` '	ventilation or w	hole house	e positiv	ve input	ventilati	on from	I loft				J	
	n = 1, then (24)							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24d)
Effective air	change rate - e	enter (24a)	or (24b	o) or (24	c) or (24	ld) in bo	x (25)		-			
(25)m= 0.28	0.28 0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27		(25)
3 Heat losse:	s and heat loss	paramete	r.									
ELEMENT	Gross area (m²)	Opening m²	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
Doors	a. oa ()			2.6	 x	1.2		3.12		1.0,111		(26)
Windows Type	: 1			7.15		/[1/(1.2)+		8.19	=			(27)
Windows Type				2.19	=	/[1/(1.2)+		2.51	=			(27)
Windows Type				0.75	_	/[1/(1.2)+		0.86	\dashv			(27)
Walls Type1	59.86	17.24		42.62	=	0.15		6.39	=		$\neg \sqcap$	(29)
Walls Type2	24.47	2.6	=	21.87		0.15	_	3.28	=			(29)
Walls Type3	2.57	0	=	2.57		0.15		0.39	=		-	(29)
Roof	54.34	0	=	54.34	=	0.15	_	8.15	륵 ¦		= =	(30)
Total area of e				141.2	=	0.10		0.10				(31)
Party wall				7.81	=	0		0	— [(32)
Party floor				54.34	_						╡	(32a)
* for windows and	roof windows, use	effective win	ndow U-va			g formula :	1/[(1/U-valu	ue)+0.04] á	L as given in	paragraph		(020)
** include the area												
Fabric heat los	ss, $W/K = S(A)$	x U)				(26)(30) + (32) =				41.07	(33)
Heat capacity	Cm = S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	17733.8	(34)
Thermal mass	parameter (TM	1P = Cm ÷	TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instead			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L x Y) ca	alculated u	sing Ap	pendix l	K						28.62	(36)
if details of therma Total fabric hea	l bridging are not l	known (36) =	0.15 x (3	31)			(55)	- (36) =				(37)

Ventila	ation hea	nt loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	13.06	12.91	12.76	12.02	11.87	11.13	11.13	10.98	11.42	11.87	12.17	12.46		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	82.75	82.6	82.45	81.71	81.56	80.81	80.81	80.66	81.11	81.56	81.85	82.15		
Heat Id	oss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	81.67	(39)
(40)m=	1.52	1.52	1.52	1.5	1.5	1.49	1.49	1.48	1.49	1.5	1.51	1.51		
Numbe	er of day	s in moi	nth (Tab	le 1a)				•	,	Average =	Sum(40) ₁ .	12 /12=	1.5	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
	ater heat			irement:							1.	kWh/ye	ear:	(42
if TF	A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.				•
Reduce	I averag the annua e that 125	ıl average	hot water	usage by	5% if the α	lwelling is	designed i	` ,		se target o		7.38		(43
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)			•			
(44)m=	85.12	82.02	78.92	75.83	72.73	69.64	69.64	72.73	75.83	78.92	82.02	85.12		
Energy (content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		928.53	(44
(45)m=	126.22	110.4	113.92	99.32	95.3	82.23	76.2	87.44	88.49	103.12	112.57	122.24		
lf instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1217.45	(45
(46)m=	18.93	16.56	17.09	14.9	14.29	12.34	11.43	13.12	13.27	15.47	16.89	18.34		(46
	storage													
·	e volum	` ,					•		ame ves	sel		0		(47
Otherv	munity h vise if no storage	stored			_			. ,	ers) ente	er '0' in (47)			
a) If m	nanufact	urer's de	eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48
Tempe	erature fa	actor fro	m Table	2b								0		(49
	y lost fro nanufact		_	-		or is not		(48) x (49)) =		1	10		(50
	ater stora munity h	_			e 2 (kW	h/litre/da	ıy)				0.	02		(5
	e factor	•									1.	.03		(52
Tempe	erature fa	actor fro	m Table	2b								.6		(53
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54
Enter	(50) or (54) in (5	55)								1.	.03		(55
Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				

If cylinder cont	ains dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) - (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.0	1 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circ	uit loss (ar	nnual) fro	m Table	3							0		(58)
Primary circ	•	,			59)m = ((58) ÷ 36	65 × (41)	m				'	
(modified	by factor f	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.2	6 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss	calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat re	equired for	water h	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 181.	5 160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		(62)
Solar DHW inp	ut calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additio	nal lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	iter											
(64)m= 181.	5 160.32	169.2	152.81	150.57	135.73	131.48	142.72	141.98	158.4	166.06	177.52		
	•						Outp	out from wa	ater heate	r (annual) ₁	12	1868.29	(64)
Heat gains	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	
(65)m= 86.1	9 76.65	82.1	75.82	75.91	70.14	69.56	73.3	72.22	78.51	80.22	84.87		(65)
include (5	7)m in cal	culation of	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal	gains (see	e Table 5	and 5a):									
Metabolic g													
	airis Crabie	e 5). Wat	ts										
Ja		5), Wat Mar	ts Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	n Feb			May 90.9	Jun 90.9	Jul 90.9	Aug 90.9	Sep 90.9	Oct 90.9	Nov 90.9	Dec 90.9		(66)
Jai	n Feb 90.9	Mar 90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		-			(66)
(66)m= 90.9	n Feb 90.9 ns (calcula	Mar 90.9	Apr 90.9	90.9	90.9	90.9	90.9	90.9		-			(66) (67)
Jai (66)m= 90.9 Lighting gai	n Feb 90.9 ns (calcula 3 12.55	Mar 90.9 ted in Ap 10.21	Apr 90.9 opendix 7.73	90.9 L, equat 5.78	90.9 ion L9 o 4.88	90.9 r L9a), a 5.27	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		
(66)m= 90.9 Lighting gai (67)m= 14.1	n Feb 90.9 ns (calcula 3 12.55 gains (calc	Mar 90.9 ted in Ap 10.21	Apr 90.9 opendix 7.73	90.9 L, equat 5.78	90.9 ion L9 o 4.88	90.9 r L9a), a 5.27	90.9 Iso see	90.9 Table 5	90.9	90.9	90.9		
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13	Mar 90.9 ted in Ap 10.21 culated in	Apr 90.9 ppendix 7.73 Append 147.16	90.9 L, equat 5.78 dix L, eq 136.02	90.9 ion L9 or 4.88 uation L	90.9 r L9a), a 5.27 13 or L1 118.56	90.9 Iso see 6.85 3a), also	90.9 Table 5 9.19 see Ta	90.9 11.67 ble 5 129.89	90.9	90.9		(67)
Jai (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 160.13 ns (calcula	Mar 90.9 ted in Ap 10.21 culated in	Apr 90.9 ppendix 7.73 Append 147.16	90.9 L, equat 5.78 dix L, eq 136.02	90.9 ion L9 or 4.88 uation L	90.9 r L9a), a 5.27 13 or L1 118.56	90.9 Iso see 6.85 3a), also	90.9 Table 5 9.19 see Ta	90.9 11.67 ble 5 129.89	90.9	90.9		(67)
Jan 90.9	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09	Apr 90.9 opendix 7.73 Append 147.16 opendix 32.09	90.9 L, equat 5.78 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.88 uation L 125.56 ion L15	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a)	90.9 lso see 6.85 3a), also 116.92	90.9 Table 5 9.19 See Ta 121.06 ee Table	90.9 11.67 ble 5 129.89	90.9	90.9		(67) (68)
Jal (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09	Apr 90.9 opendix 7.73 Append 147.16 opendix 32.09	90.9 L, equat 5.78 dix L, eq 136.02 L, equat	90.9 ion L9 or 4.88 uation L 125.56 ion L15	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a)	90.9 lso see 6.85 3a), also 116.92	90.9 Table 5 9.19 See Ta 121.06 ee Table	90.9 11.67 ble 5 129.89	90.9	90.9		(67) (68)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92), also se 32.09	90.9 Table 5 9.19 see Ta 121.06 ee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69)
Jan (66)m= 90.9	n Feb 90.9 ns (calcula 12.55 gains (calcula 160.13 ns (calcula 9 32.09 fans gains 0 evaporation	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92), also se 32.09	90.9 Table 5 9.19 see Ta 121.06 ee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92 1, also se 32.09	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09	90.9 14.52 151.49 32.09		(67) (68) (69) (70)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5)	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09	90.9 Iso see 6.85 3a), also 116.92 1, also se 32.09	90.9 Table 5 9.19 See Ta 121.06 See Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09	90.9 13.62 141.02 32.09 0	90.9 14.52 151.49 32.09 0		(67) (68) (69) (70)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.6	n Feb 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72 ng gains (73 35 114.06	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 a (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5) -72.72	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72	90.9 13.62 141.02 32.09 0 -72.72	90.9 14.52 151.49 32.09 0 -72.72		(67) (68) (69) (70)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7 35 114.06 nal gains =	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 ole 5) -72.72 97.41 (66)	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m	90.9 lso see 6.85 3a), also 116.92), also se 32.09 0 -72.72 98.52 1+ (68)m+	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72 100.3 + (69)m + (6	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72)	90.9 14.52 151.49 32.09 0 -72.72 114.07		(67) (68) (69) (70) (71)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.4 Total interr (73)m= 338.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporation 72 -72.72 ng gains (73 114.06 nal gains =	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 a (Table 5 0 on (negar -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Appendix 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab	90.9 ion L9 or 4.88 uation L 125.56 ion L15 32.09 0 lle 5) -72.72	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 Pee Table 32.09 0 -72.72	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72	90.9 13.62 141.02 32.09 0 -72.72	90.9 14.52 151.49 32.09 0 -72.72		(67) (68) (69) (70)
Jan (66)m= 90.9	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (73 35 114.06 nal gains = 73 337.01 nins:	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table § 0 on (negated) -72.72 Table 5) 110.35	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72 102.03	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 le 5) -72.72 97.41 (66) 278.12	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m 267.6	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 See Table 32.09 0 -72.72 100.3 + (69)m + (280.83)	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7 297.35	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72) 316.34	90.9 14.52 151.49 32.09 0 -72.72 114.07		(67) (68) (69) (70) (71)
Jan (66)m= 90.9 Lighting gai (67)m= 14.1 Appliances (68)m= 158.4 Cooking gai (69)m= 32.0 Pumps and (70)m= 0 Losses e.g. (71)m= -72.7 Water heati (72)m= 115.4 Total interr (73)m= 338.7	n Feb 9 90.9 ns (calcula 3 12.55 gains (calcula 48 160.13 ns (calcula 9 32.09 fans gains 0 evaporatio 72 -72.72 ng gains (7 35 114.06 nal gains = 73 337.01 ins: re calculated	Mar 90.9 ted in Ap 10.21 culated in 155.98 ated in A 32.09 c (Table 5 0 on (negar -72.72 Table 5) 110.35 = 326.81 using sola	Apr 90.9 ppendix 7.73 Append 147.16 ppendix 32.09 5a) 0 tive valu -72.72	90.9 L, equat 5.78 dix L, eq 136.02 L, equat 32.09 0 es) (Tab -72.72 102.03	90.9 ion L9 of 4.88 uation L 125.56 ion L15 32.09 0 le 5) -72.72 97.41 (66) 278.12	90.9 r L9a), a 5.27 13 or L1 118.56 or L15a) 32.09 0 -72.72 93.49 m + (67)m 267.6	90.9 so see	90.9 Table 5 9.19 See Ta 121.06 See Table 32.09 0 -72.72 100.3 + (69)m + (280.83)	90.9 11.67 ble 5 129.89 5 32.09 0 -72.72 105.52 (70)m + (7 297.35	90.9 13.62 141.02 32.09 0 -72.72 111.42 1)m + (72) 316.34	90.9 14.52 151.49 32.09 0 -72.72 114.07	Gains	(67) (68) (69) (70) (71)

Northeast _{0.9x}	0.77	X	7.15	X	11.2	8	X	0.24	X	0.7	=	18.78	(75)
Northeast _{0.9x}	0.77	X	7.15	X	22.9	7	X	0.24	X	0.7	=	38.24	(75)
Northeast _{0.9x}	0.77	x	7.15	x	41.3	8	X	0.24	X	0.7	=	68.89	(75)
Northeast _{0.9x}	0.77	x	7.15	x	67.9	6	x	0.24	X	0.7	=	113.14	(75)
Northeast _{0.9x}	0.77	x	7.15	x	91.3	5	х	0.24	X	0.7	=	152.08	(75)
Northeast _{0.9x}	0.77	x	7.15	x	97.3	8	x	0.24	x	0.7		162.13	(75)
Northeast 0.9x	0.77	x	7.15	x	91.	I	x	0.24	x	0.7	=	151.67	(75)
Northeast _{0.9x}	0.77	x	7.15	x	72.6	3	x	0.24	X	0.7	=	120.91	(75)
Northeast _{0.9x}	0.77	x	7.15	x	50.4	2	x	0.24	X	0.7	=	83.94	(75)
Northeast 0.9x	0.77	x	7.15	x	28.0	7	x	0.24	X	0.7	=	46.73	(75)
Northeast _{0.9x}	0.77	x	7.15	x	14.2	2	x	0.24	X	0.7	=	23.64	(75)
Northeast _{0.9x}	0.77	x	7.15	x	9.2	I	X	0.24	X	0.7	=	15.34	(75)
Southwest _{0.9x}	0.77	x	2.19	x	36.7	9		0.24	X	0.7	=	9.38	(79)
Southwest _{0.9x}	0.77	x	0.75	x	36.7	9		0.24	X	0.7	=	3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	x	62.6	7		0.24	X	0.7	=	15.98	(79)
Southwest _{0.9x}	0.77	x	0.75	x	62.6	7		0.24	x	0.7		5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	x	85.7	5		0.24	x	0.7		21.86	(79)
Southwest _{0.9x}	0.77	x	0.75	x	85.7	5		0.24	x	0.7	=	7.49	(79)
Southwest _{0.9x}	0.77	х	2.19	х	106.2	25		0.24	x	0.7	=	27.09	(79)
Southwest _{0.9x}	0.77	x	0.75	x	106.2	25		0.24	x	0.7	=	9.28	(79)
Southwest _{0.9x}	0.77	x	2.19	x	119.0	01		0.24	х	0.7	=	30.34	(79)
Southwest _{0.9x}	0.77	х	0.75	х	119.0	01		0.24	x	0.7	= =	10.39	(79)
Southwest _{0.9x}	0.77	х	2.19	х	118.	15		0.24	x	0.7	-	30.12	(79)
Southwest _{0.9x}	0.77	x	0.75	x	118.	15		0.24	х	0.7	=	10.32	(79)
Southwest _{0.9x}	0.77	х	2.19	x	113.9	91		0.24	x	0.7	=	29.04	(79)
Southwest _{0.9x}	0.77	x	0.75	x	113.9	91		0.24	x	0.7		9.95	(79)
Southwest _{0.9x}	0.77	x	2.19	x	104.3	39		0.24	x	0.7		26.62	(79)
Southwest _{0.9x}	0.77	x	0.75	x	104.3	39		0.24	x	0.7		9.12	(79)
Southwest _{0.9x}	0.77	x	2.19	x	92.8	5		0.24	x	0.7		23.67	(79)
Southwest _{0.9x}	0.77	x	0.75	x	92.8	5		0.24	x	0.7	=	8.11	(79)
Southwest _{0.9x}	0.77	x	2.19	x	69.2	7		0.24	x	0.7		17.66	(79)
Southwest _{0.9x}	0.77	x	0.75	x	69.2	7		0.24	x	0.7		6.05	(79)
Southwest _{0.9x}	0.77	x	2.19	x	44.0	7		0.24	x	0.7	=	11.24	(79)
Southwest _{0.9x}	0.77	x	0.75	x	44.0	7		0.24	x	0.7		3.85	(79)
Southwest _{0.9x}	0.77	x	2.19	x	31.4	9		0.24	x	0.7		8.03	(79)
Southwest _{0.9x}	0.77	x	0.75	x	31.4	9		0.24	x	0.7	=	2.75	(79)
				-									_
Solar gains in v	vatts, calcul	ated	for each mon	th			(83)m	= Sum(74)m	(82)m	_		•	
(83)m= 31.38	59.69 98.		149.51 192.8			90.66	156	.65 115.73	70.44	38.72	26.12		(83)
Total gains – in			` 	`					i			1	
(84)m= 370.11	396.7 425	5.05	459.97 486.9	1 4	80.69 4	58.26	429	396.55	367.79	355.06	356.47		(84)
7. Mean intern	al temperat	ure (heating seaso	on)									
Temperature of	during heatii	ng pe	eriods in the li	ving	area fro	m Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fact	<u>_</u>	$\overline{}$		Ť					1			1	
Stroma ESA 2012	vErsbn: 1.0.4	196 (s	SAP 9.52 - http://	₩w.	stroma.co	႕ျ	Αι	ug Sep	Oct	Nov	Dec	Page	5 of 8

(86)m= 1 0.99 0.99 0.98 0.93 0.83 0.69 0.74 0.91 0.98 0.99 1	(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)	
(87)m= 19.36 19.49 19.75 20.12 20.51 20.81 20.94 20.91 20.68 20.21 19.73 19.34	(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)	
(88)m= 19.67 19.67 19.68 19.69 19.7 19.7 19.7 19.69 19.68 19.68	(88)
	(00)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	
(89)m= 1 0.99 0.99 0.97 0.9 0.74 0.52 0.58 0.85 0.97 0.99 1	(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	
(90)m= 17.53 17.71 18.09 18.64 19.18 19.56 19.67 19.66 19.42 18.77 18.07 17.5	(90)
$fLA = Living area \div (4) = 0.25$	(91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$	_
(92)m= 17.99 18.16 18.51 19.01 19.51 19.87 19.99 19.98 19.73 19.13 18.48 17.96	(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate	(/
(93)m= 17.99 18.16 18.51 19.01 19.51 19.87 19.99 19.98 19.73 19.13 18.48 17.96	(93)
8. Space heating requirement	(00)
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate	
the utilisation factor for gains using Table 9a	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Utilisation factor for gains, hm:	
(94)m= 0.99 0.99 0.98 0.96 0.89 0.75 0.57 0.62 0.86 0.96 0.99 0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m	
(95)m= 367.38 392.51 417.04 440.27 435.54 362.05 259.6 267.23 339.64 354.44 350.71 354.22	(95)
Monthly average external temperature from Table 8	
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]	
(97)m= 1132.5 1094.9 989.8 826.4 637.1 426.11 273.9 288.39 456.98 695.8 931.89 1130.47	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m	
(98)m= 569.24 472 426.14 278.01 149.96 0 0 0 253.97 418.45 577.53	
Total per year (kWh/year) = Sum(98) _{15,912} = 3145.31	(98)
	」 (99)
8c. Space cooling requirement	
Calculated for June, July and August. See Table 10b	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10)	(400)
(100)m= 0 0 0 0 0 759.65 598.02 613.05 0 0 0	(100)
Utilisation factor for loss hm	(404)
(101)m= 0 0 0 0 0 0.71 0.8 0.76 0 0 0 0	(101)
Useful loss, hmLm (Watts) = (100)m x (101)m	(4.00)
(102)m= 0 0 0 0 542.27 478.02 468.69 0 0 0 0	(102)
Gains (solar gains calculated for applicable weather region, see Table 10)	(400)
(103)m= 0 0 0 0 617.86 590.56 557.32 0 0 0 0	(103)
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 × (98)m	
(104)m 0 0 0 0 0 83.73 65.94 0 0 0 0	
Total = Sum(1.04) = 149.67	(104)

On the Harristee									4)		(405)
Cooled fraction Intermittency factor (Table	e 10b)					1 C =	cooled	area ÷ (4) =	0.7	(105)
(106)m= 0 0	<u> </u>	0	0.25	0.25	0.25	0	0	0	0		
Space cooling requiremen	nt for mon	th _ (10)	I)m + (10E)	· · (106)	m	Tota	I = Sum	(104)	=	0	(106)
Space cooling requireme (107)m= 0 0	0 (14.64	11.53	0	0	0	0	1	
	I		!			Tota	l = Sum((1,0,7)	=	26.17	(107)
Space cooling requireme	nt in kWh	m²/year				(107) ÷ (4) =			0.48	(108)
9b. Energy requirements											
This part is used for spac Fraction of space heat from								unity so	heme.	0	(301)
Fraction of space heat fro	om commi	unity syst	em 1 – (30	1) =						1	(302)
The community scheme may ob includes boilers, heat pumps, go							up to four	other hea	t sources;	the latter	
Fraction of heat from Cor	nmunity C	HP								0.13	(303a)
Fraction of community he	at from he	eat sourc	e 2							0.87	(303b)
Fraction of total space he	at from C	ommunit	y CHP				(3	802) x (303	3a) =	0.13	(304a)
Fraction of total space he	at from co	mmunity	heat sour	ce 2			(3	802) x (303	3b) =	0.87	(304b)
Factor for control and cha	arging me	thod (Tal	ole 4c(3)) fo	or comm	unity hea	iting sys	tem			1	(305)
Distribution loss factor (Ta	able 12c)	for comn	nunity heat	ina syste	m					1.05	(306)
				g oyoto	1111					1.00	(000)
Space heating			,	g oyoto	:111					kWh/yea	
Annual space heating rec	•		,	g						kWh/yea	ar
Annual space heating rec Space heat from Commu	nity CHP		,	ing oyoto		`	04a) x (30	, , ,		kWh/yea	(307a)
Annual space heating rec Space heat from Commu Space heat from heat sou	nity CHP		·			(98) x (3	04b) x (30	5) x (306)		kWh/yea	(307a) (307b)
Annual space heating recommunications Space heat from Communication Space heat from heat source Efficiency of secondary/s	nity CHP urce 2 upplemen	tary heat	ing system	in % (fro	om Table	(98) x (3	04b) x (30 Appendix	5) x (306)		kWh/yea 3145.31 429.33	(307a) (307b) (308
Annual space heating rec Space heat from Commu Space heat from heat sou	nity CHP urce 2 upplemen	tary heat	ing system	in % (fro	om Table	(98) x (3	04b) x (30	5) x (306)		kWh/yea 3145.31 429.33 2873.24	(307a) (307b)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating	nity CHP urce 2 upplemen nt from se	tary heat	ing system	in % (fro	om Table	(98) x (3	04b) x (30 Appendix	5) x (306)		kWh/yei 3145.31 429.33 2873.24 0	(307a) (307b) (308
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req	nity CHP urce 2 upplemen nt from se	tary heat	ing system	in % (fro	om Table	(98) x (3	04b) x (30 Appendix	5) x (306)		kWh/yea 3145.31 429.33 2873.24	(307a) (307b) (308
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating	nity CHP urce 2 upplement ont from se uirement scheme:	tary heat	ing system	in % (fro	om Table	(98) x (3 4a or A (98) x (3	04b) x (30 Appendix	5) x (306) x E) ÷ (308) =	=	kWh/yei 3145.31 429.33 2873.24 0	(307a) (307b) (308
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s	nity CHP urce 2 upplement ont from se uirement scheme: nity CHP	tary heat	ing system	in % (fro	om Table	(98) x (3 4a or A (98) x (3 (64) x (3	04b) x (30 appendix 01) x 100	5) x (306) (E) ÷ (308) =	=	kWh/yes 3145.31 429.33 2873.24 0 0	(307a) (307b) (308 (309)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Community	nity CHP urce 2 upplement ont from se uirement scheme: nity CHP urce 2	tary heat	ing system	in % (fro	om Table tem	(98) x (3 4a or A (98) x (3 (64) x (3 (64) x (3	04b) x (30 appendix 01) x 100 03a) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29	(307a) (307b) (308 (309) (310a)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou	nity CHP urce 2 upplement ont from se uirement scheme: nity CHP urce 2	tary heat	ing system	in % (fro	om Table tem	(98) x (3 4a or A (98) x (3 (64) x (3 (64) x (3	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68	(307a) (307b) (308 (309) (310a) (310b)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou Electricity used for heat de	nity CHP urce 2 upplement ont from se uirement scheme: nity CHP urce 2 listribution	tary heat econdary.	ing system	in % (fro	om Table tem	(98) x (3 4a or A (98) x (3 (64) x (3 (64) x (3	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64	(307a) (307b) (308 (309) (310a) (310b) (313)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou Electricity used for heat d Cooling System Energy E	nity CHP urce 2 upplement of from se uirement scheme: nity CHP urce 2 listribution efficiency a fixed co fans withi	tary heat econdary Ratio oling sys	ing system supplement tem, if not	enter 0)	om Table tem 0.01	(98) × (3 • 4a or A (98) × (3 (64) × (3 (64) × (3 × [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73	(307a) (307b) (308 (309) (310a) (310b) (313) (314)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou Electricity used for heat d Cooling System Energy E Space cooling (if there is Electricity for pumps and	nity CHP urce 2 upplement ont from se uirement scheme: nity CHP urce 2 listribution efficiency a fixed co fans withi balanced,	tary heat econdary Ratio oling sys	ing system supplement tem, if not	enter 0)	om Table tem 0.01	(98) × (3 • 4a or A (98) × (3 (64) × (3 (64) × (3 × [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54	(307a) (307b) (308 (309) (310a) (310b) (313) (314) (315)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou Electricity used for heat d Cooling System Energy E Space cooling (if there is Electricity for pumps and mechanical ventilation - b	nity CHP urce 2 upplement of from security CHP urce 2 listribution efficiency a fixed co fans withi balanced, fans	tary heat econdary Ratio oling sys	ing system supplement tem, if not	enter 0)	om Table tem 0.01	(98) × (3 • 4a or A (98) × (3 (64) × (3 (64) × (3 × [(307a)	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) ÷ (308) = 5) x (306) 5) x (306)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54	(307a) (307b) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a)
Annual space heating red Space heat from Commu Space heat from heat sou Efficiency of secondary/s Space heating requireme Water heating Annual water heating req If DHW from community s Water heat from Commun Water heat from heat sou Electricity used for heat d Cooling System Energy E Space cooling (if there is Electricity for pumps and mechanical ventilation - b warm air heating system	nity CHP urce 2 upplement of from security CHP urce 2 listribution efficiency a fixed co fans withi balanced, fans ting	tary heat econdary, Ratio oling sys n dwellin extract o	ing system supplement tem, if not	enter 0)	om Table tem 0.01	(98) × (3 4a or A (98) × (3 (64) × (3 × [(307a) = (107) ÷	04b) x (30 appendix 01) x 100 03a) x (30 03b) x (30 (307e) +	5) x (306) 5) x (308) = 5) x (306) 5) x (306) 10 + (310a)	= = =	kWh/yes 3145.31 429.33 2873.24 0 0 1868.29 255.02 1706.68 52.64 4.73 5.54 90.49 0	(307a) (307b) (307b) (308 (309) (310a) (310b) (313) (314) (315) (330a) (330b)

Energy for lighting (calculated in Appendix L)		249.52 (332)
Electricity generated by PVs (Appendix M) (negative quantity	y)	-116.33 (333)
Electricity generated by wind turbine (Appendix M) (negative	e quantity)	0 (334)
12b. CO2 Emissions – Community heating scheme		
Electrical efficiency of CHP unit		30.6 (361)
Heat efficiency of CHP unit		63 (362)
	Energy Emission fact kWh/year kg CO2/kWh	or Emissions kg CO2/year
Space heating from CHP) $(307a) \times 100 \div (362) =$	681.48 × 0.22	147.2 (363)
less credit emissions for electricity $-(307a) \times (361) \div (362) =$	208.53 × 0.52	-108.23 (364)
Water heated by CHP $(310a) \times 100 \div (362) =$	404.8 × 0.22	87.44 (365)
less credit emissions for electricity $-(310a) \times (361) \div (362) =$	123.87 X 0.52	-64.29 (366)
Efficiency of heat source 2 (%)	using two fuels repeat (363) to (366) for the second	96.7 (367b)
CO2 associated with heat source 2 [(30)	7b)+(310b)] x 100 ÷ (367b) x 0.22	= 1023.02 (368)
Electrical energy for heat distribution	[(313) x 0.52	= 27.32 (372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	= 1112.46 (373)
CO2 associated with space heating (secondary)	(309) x	= 0 (374)
CO2 associated with water from immersion heater or instant	taneous heater (312) x 0.22	= 0 (375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =	1112.46 (376)
CO2 associated with space cooling	(315) x 0.52	= 2.87 (377)
CO2 associated with electricity for pumps and fans within dv	welling (331)) x 0.52	= 46.97 (378)
CO2 associated with electricity for lighting	(332))) x 0.52	= 129.5 (379)
Energy saving/generation technologies (333) to (334) as applitem 1	plicable 0.52 × 0.0°	1 = -60.38 (380)
Total CO2, kg/year sum of (376)(382) =		1231.43 (383)
Dwelling CO2 Emission Rate (383) ÷ (4) =		22.66 (384)
El rating (section 14)		83.39 (385)

		l lsar I	Details:						
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.10	
	F	Property	Address	Flat 4-2	2-Green				
Address: 1. Overall dwelling dime	nsions:								
1. Overall awelling diffic	11310113.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Basement				(1a) x		2.6	(2a) =	144.59	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	55.61	(4)			- '		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	144.59	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	7 + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	-	0	Ī = Ē	0	x2	20 =	0	(6b)
Number of intermittent fa	ns			, L	0	x '	10 =	0	(7a)
Number of passive vents				Ē	0	x '	10 =	0	(7b)
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)
				L					
				_			Air ch	nanges per ho	our —
•	ys, flues and fans = (6a)+(6b)+(een carried out or is intended, procee			continuo fr	0		÷ (5) =	0	(8)
Number of storeys in the		id 10 (17),	ourier wise t	onunae n	om (9) to	(10)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are pri deducting areas of openir	resent, use the value corresponding t ngs); if equal user 0.35	o the grea	ter wall are	a (after					
If suspended wooden f	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	•							0	(13)
<u>-</u>	s and doors draught stripped		0.05 10.0	(4.4) 4	1001			0	(14)
Window infiltration			0.25 - [0.2] (8) + (10)	. ,	-	. (15) -		0	(15)
Infiltration rate	q50, expressed in cubic metro	oc por b					oroo	0	(16)
•	ity value, then (18) = [(17) ÷ 20]+	•	•	•	elle ol e	rivelope	alea	0.15	(17)
•	s if a pressurisation test has been do				is being u	sed	ļ	0.13	(10)
Number of sides sheltere	d							3	(19)
Shelter factor			(20) = 1 -		19)] =			0.78	(20)
Infiltration rate incorporat	_		(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified for		1	T .		Π_	1	I _	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	 	T	T		T	1		1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate (allo	owing for s	helter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effec	-	ge rate for	he appli	cable ca	se	•		•		•		
	al ventilation:	on an all a NL 76	201-) (00-	-) - - (-		MEW - de -		\ (00-\			0.5	(238
	eat pump using A							o) = (23a)			0.5	(23)
	n heat recovery: e	-	_								76.5	(230
	ed mechanical		1		<u> </u>	- ^ ` 	í `	 		- ` ') ÷ 100] 1	(0.4
(24a)m= 0.27	0.26 0.26		0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(248
· ·	ed mechanical	- I	1	1		- 	ŕ	<u> </u>		<u> </u>	1	(0.4)
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24
•	ouse extract vn $< 0.5 \times (23b)$			-				.5 × (23b)		_	
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
,	ventilation or ventil		•					0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate -	enter (24a	a) or (24l	b) or (24	c) or (24	d) in box	(25)	•		•		
(25)m= 0.27	0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(25)
3. Heat losse	s and heat los	s paramet	er:			•	•			•		
ELEMENT	Gross area (m²)	Openir n	ngs n²	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-	-	A X k kJ/K
Doors				2.6	X	1.2	=	3.12				(26)
Windows Type) 1			7.15	x1	/[1/(1.2)+	0.04] =	8.19				(27)
Windows Type	2			2.19	x1	/[1/(1.2)+	0.04] =	2.51				(27)
Windows Type	3 3			0.75	x1	/[1/(1.2)+	0.04] =	0.86				(27)
Walls Type1	34.66	17.2	4	17.42	<u> </u>	0.15		2.61	=			(29)
Walls Type2	23.92	2.6		21.32	<u> </u>	0.15		3.2			i i	(29)
Walls Type3	2.63	0	=	2.63	= x	0.15	=	0.39	=		-	(29)
Walls Type4	25.13	0	=	25.13	=	0.15		3.77	ᆿ ¦		╡┝	(29)
Roof	55.61	0	=	55.61	=	0.15		8.34	ᆿ ¦		╡ ⊨	(30)
Total area of e				141.9	=	0.13		0.04				(31)
Party wall	iomonto, m				=		—	0				
i aity wali				7.81	x	0	=	0	<u> </u>		_	(32)
•				55.61					e aires is	naragrar		(32
Party floor	roof windows us	o offootivo w	indow II v	الروامة	atad uning	r formula 1	/[/1/ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					
Party floor * for windows and					ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	s giveri ili	i parayrapi	. 0.2	
Party floor * for windows and ** include the area	as on both sides o	of internal wa			ated using	g formula 1 (26)(30)		ıе)+0.04] а	s giveri ili	i paragrapi	41.18	(33)
Party floor * for windows and ** include the area Fabric heat los	as on both sides on ss, W/K = S (A	of internal wa x X U)			ated using) + (32) =	(30) + (32				
Party floor * for windows and ** include the area Fabric heat los Heat capacity	as on both sides on ss, W/K = S (A Cm = S(A x k	of internal wa x x U))	lls and par	titions) + (32) = ((28).		2) + (32a).		41.18	19 (34)
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	as on both sides of ss, W/K = S (A Cm = S(A x k parameter (T sments where the	of internal wa. X X U) MP = Cm - details of the	lls and par ÷ TFA) ir	titions n kJ/m²K		(26)(30)) + (32) = ((28). Indica	(30) + (32	2) + (32a). Medium	(32e) =	41.18	
Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	as on both sides on so, W/K = S (A x k) Cm = S(A x k) parameter (The same to	of internal wa (x U)) MP = Cm - details of the alculation.	: TFA) ir	n kJ/m²K tion are not	t known p	(26)(30)) + (32) = ((28). Indica	(30) + (32	2) + (32a). Medium	(32e) =	41.18	(34)

Total fabric heat loss	(33) + (36) = 69.75
Ventilation heat loss calculated monthly	$(38)m = 0.33 \times (25)m \times (5)$
	ul Aug Sep Oct Nov Dec
- 	.88 10.74 11.15 11.57 11.85 12.12 (38)
Heat transfer coefficient, W/K	(39)m = (37) + (38)m
(39)m= 82.42 82.28 82.15 81.45 81.31 80.62 80	.62 80.48 80.9 81.31 81.59 81.87
Heat loss parameter (HLP), W/m²K	Average = Sum(39) ₁₁₂ /12= 81.42 (39) (40)m = (39)m ÷ (4)
(40)m= 1.48 1.48 1.48 1.46 1.46 1.45 1	45 1.45 1.45 1.46 1.47 1.47
Number of days in month (Table 1a)	Average = Sum(40) ₁₁₂ /12= 1.46 (40)
Jan Feb Mar Apr May Jun	ul Aug Sep Oct Nov Dec
(41)m= 31 28 31 30 31 30	31 31 30 31 30 31 (41)
	<u> </u>
4. Water heating energy requirement:	kWh/year:
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -	13.9)2)] + 0.0013 x (TFA -13.9) (42)
if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd,average Reduce the annual average hot water usage by 5% if the dwelling is design.	
not more that 125 litres per person per day (all water use, hot and cold)	
	ul Aug Sep Oct Nov Dec
Hot water usage in litres per day for each month Vd,m = factor from Table	1c x (43)
(44)m= 86.09 82.96 79.83 76.7 73.57 70.44 70	.44 73.57 76.7 79.83 82.96 86.09
Energy content of hot water used - calculated monthly = $4.190 \times Vd, m \times r$	Total = Sum(44) ₁₁₂ = 939.13 (44) m x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)
(45)m= 127.67 111.66 115.22 100.45 96.39 83.17 77	.07 88.44 89.5 104.3 113.85 123.64
If instantaneous water heating at point of use (no hot water storage), ente	Total = Sum(45) ₁₁₂ = 1231.35 (45) or 0 in hoves (46) to (61)
(46)m= 19.15 16.75 17.28 15.07 14.46 12.48 17. Water storage loss:	.56 13.27 13.42 15.65 17.08 18.55 (46)
Storage volume (litres) including any solar or WWHRS stor	age within same vessel 0 (47)
If community heating and no tank in dwelling, enter 110 litr	es in (47)
Otherwise if no stored hot water (this includes instantaneous	s combi boilers) enter '0' in (47)
Water storage loss:	(40)
 a) If manufacturer's declared loss factor is known (kWh/da Temperature factor from Table 2b 	
•	0 (49)
Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known.	$(48) \times (49) = $
Hot water storage loss factor from Table 2 (kWh/litre/day)	0.02 (51)
If community heating see section 4.3 Volume factor from Table 2a	1.03 (52)
Temperature factor from Table 2b	0.6 (53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) = 1.03 (54)
Enter (50) or (54) in (55)	1.03 (55)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	l for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 182.94	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contributi	ion to wate	er heating)		
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)													
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 182.94	161.58	170.5	153.94	151.66	136.67	132.35	143.72	142.99	159.58	167.35	178.91		
	!						Outp	out from wa	ater heate	r (annual)₁	12	1882.19	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]													
(65)m= 86.67	77.07	82.53	76.2	76.27	70.45	69.85	<u> </u>	72.55		`	``	1	(65)
			70.2	10.21	70.75	09.00	73.63	12.55	78.9	80.65	85.33		(00)
include (57)	m in cal					<u> </u>	!	<u> </u>		<u> </u>	<u> </u>	eating	(00)
include (57)		culation o	of (65)m	only if c		<u> </u>	!	<u> </u>		<u> </u>	<u> </u>	eating	(00)
5. Internal ga	ains (see	culation of Table 5	of (65)m and 5a	only if c		<u> </u>	!	<u> </u>		<u> </u>	<u> </u>	eating	(03)
5. Internal gair	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(03)
5. Internal ga	ains (see	culation of Table 5	of (65)m and 5a	only if c		<u> </u>	!	<u> </u>		<u> </u>	<u> </u>	eating	(66)
5. Internal games Metabolic gair Jan (66)m= 92.76	rs (Table Feb 92.76	e Table 5 e 5), Wat Mar 92.76	of (65)m 5 and 5a ts Apr 92.76	only if constant of the consta	ylinder is Jun 92.76	Jul 92.76	Aug 92.76	or hot w	ater is fr	om com	munity h	eating	
5. Internal gain Metabolic gain Jan (66)m= 92.76 Lighting gains	rs (Table Feb 92.76	e Table 5 e 5), Wat Mar 92.76	of (65)m 5 and 5a ts Apr 92.76	only if constant of the consta	ylinder is Jun 92.76	Jul 92.76	Aug 92.76	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42	res (Table Feb 92.76 (calcula 12.81	e Table 5 e 5), Wat Mar 92.76 ted in Ap	of (65)m 6 and 5a ts Apr 92.76 ppendix 7.89	May 92.76 L, equati	Jun 92.76 ion L9 or	Jul 92.76 r L9a), a	Aug 92.76 Iso see	Sep 92.76 Table 5 9.38	Oct 92.76	Nov 92.76	Dec 92.76	eating	(66)
5. Internal games Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances games	res (Table Feb 92.76 (calcula 12.81 ins (calc	culation of Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42	ts Apr 92.76 ppendix 7.89 Append	May 92.76 L, equati 5.89 dix L, eq	Jun 92.76 ion L9 or 4.98 uation L	Jul 92.76 r L9a), a 5.38	Aug 92.76 Iso see 6.99 3a), also	Sep 92.76 Table 5 9.38 see Tal	Oct 92.76	Nov 92.76	Dec 92.76	eating	(66)
5. Internal games Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances games (68)m= 161.76	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43	e Table 5 e 5), Wat Mar 92.76 ted in Ap 10.42 culated in	of (65)m and 5a ts Apr 92.76 ppendix 7.89 Appendix	only if c May 92.76 L, equati 5.89 dix L, eq 138.83	Jun 92.76 ion L9 of 4.98 uation L	Jul 92.76 r L9a), a 5.38 13 or L1	Aug 92.76 Iso see 6.99 3a), also	Sep 92.76 Table 5 9.38 see Tal 123.56	Oct 92.76 11.91 ble 5 132.57	Nov 92.76	Dec 92.76	eating	(66) (67)
5. Internal games Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances games	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43	e Table 5 e 5), Wat Mar 92.76 ted in Ap 10.42 culated in	of (65)m and 5a ts Apr 92.76 ppendix 7.89 Appendix	only if c May 92.76 L, equati 5.89 dix L, eq 138.83	Jun 92.76 ion L9 of 4.98 uation L	Jul 92.76 r L9a), a 5.38 13 or L1	Aug 92.76 Iso see 6.99 3a), also	Sep 92.76 Table 5 9.38 see Tal 123.56	Oct 92.76 11.91 ble 5 132.57	Nov 92.76	Dec 92.76	eating	(66) (67)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43 (calcula 32.28	culation of Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 atted in A 32.28	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28	only if controls: May 92.76 L, equati 5.89 dix L, equati 138.83 L, equati	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a)	Aug 92.76 Iso see 6.99 3a), also 119.33	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table	Oct 92.76 11.91 ble 5 132.57	Nov 92.76 13.9	Dec 92.76	eating	(66) (67) (68)
5. Internal games Metabolic gain Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances games (68)m= 161.76 Cooking gains	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43 (calcula 32.28	culation of Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 atted in A 32.28	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28	only if controls: May 92.76 L, equati 5.89 dix L, equati 138.83 L, equati	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a)	Aug 92.76 Iso see 6.99 3a), also 119.33	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table	Oct 92.76 11.91 ble 5 132.57	Nov 92.76 13.9	Dec 92.76	eating	(66) (67) (68)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 0	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43 (calcula 32.28 ins gains 0	e Table 5 e 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5	of (65)m and 5a ts Apr 92.76 ppendix 7.89 Appendix 150.2 ppendix 32.28 5a) 0	only if controls: May 92.76 L, equati 5.89 dix L, equati 138.83 L, equati 32.28	Jun 92.76 ion L9 or 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
5. Internal games Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances games (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fames	res (Table Feb 92.76 (calcula 12.81 ins (calcula 163.43 (calcula 32.28 ins gains 0	e Table 5 e 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in A 32.28 (Table 5	of (65)m and 5a ts Apr 92.76 ppendix 7.89 Appendix 150.2 ppendix 32.28 5a) 0	only if controls: May 92.76 L, equati 5.89 dix L, equati 138.83 L, equati 32.28	Jun 92.76 ion L9 or 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 32.28	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -74.21	res (Table Feb 92.76 (calcula 12.81 ins (calcula 32.28 ins gains 0 raporatio -74.21	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in Ap 32.28 (Table 5 0 on (negation of the part of	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28 5a) 0 tive valu	only if constructions: May 92.76 L, equation 5.89 dix L, equation 138.83 L, equation 32.28 0 es) (Tab	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 0	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 92.76 (calcula 12.81 ins (calcula 32.28 ins gains 0 raporatio -74.21	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in Ap 32.28 (Table 5 0 on (negation of the part of	of (65)m s and 5a ts Apr 92.76 ppendix 7.89 Append 150.2 ppendix 32.28 5a) 0 tive valu	only if constructions: May 92.76 L, equation 5.89 dix L, equation 138.83 L, equation 32.28 0 es) (Tab	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table 32.28	Oct 92.76 11.91 ble 5 132.57 5 32.28	Nov 92.76 13.9 143.94	Dec 92.76 14.82 154.62 0	eating	(66) (67) (68) (69)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -74.21 Water heating (72)m= 116.49	res (Table Feb 92.76 (calcula 12.81 ins (calcula 32.28 res gains 0 vaporatio quantum q	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in Ap 32.28 (Table 5 0 on (negation of the Table 5) 110.93	of (65)m ts Apr 92.76 ppendix 7.89 150.2 ppendix 32.28 5a) 0 tive valu -74.21	only if construction only if construction of c	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28 0 le 5) -74.21	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28 0	Sep 92.76 Table 5 9.38 0 see Tal 123.56 ee Table 32.28 0	Oct 92.76 11.91 ble 5 132.57 5 32.28 0 -74.21	Nov 92.76 13.9 143.94 32.28 0 -74.21	Dec 92.76 14.82 154.62 32.28 0 -74.21	eating	(66) (67) (68) (69) (70)
Metabolic gair Jan (66)m= 92.76 Lighting gains (67)m= 14.42 Appliances ga (68)m= 161.76 Cooking gains (69)m= 32.28 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -74.21 Water heating	res (Table Feb 92.76 (calcula 12.81 ins (calcula 32.28 res gains 0 vaporatio quantum q	culation of the Table 5 2 5), Wat Mar 92.76 ted in Ap 10.42 culated in 159.2 ated in Ap 32.28 (Table 5 0 on (negation of the Table 5) 110.93	of (65)m ts Apr 92.76 ppendix 7.89 150.2 ppendix 32.28 5a) 0 tive valu -74.21	only if construction only if construction of c	Jun 92.76 ion L9 of 4.98 uation L 128.15 ion L15 32.28 0 le 5) -74.21	Jul 92.76 r L9a), a 5.38 13 or L1 121.01 or L15a) 32.28	Aug 92.76 Iso see 6.99 3a), also 119.33), also se 32.28 0	Sep 92.76 Table 5 9.38 see Tal 123.56 ee Table 32.28 0 -74.21	Oct 92.76 11.91 ble 5 132.57 5 32.28 0 -74.21	Nov 92.76 13.9 143.94 32.28 0 -74.21	Dec 92.76 14.82 154.62 32.28 0 -74.21	eating	(66) (67) (68) (69) (70)

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d	or	Area m²		Flu: Tak	x ole 6a		g_ Table 6b		FF Table 6c			Gains (W)	
Northeast 0.9x	0.77	x	7.15	x	1	1.28	x	0.24	×	0.7		- [18.78	(75)
Northeast 0.9x	0.77	x	7.15	x	2	2.97	x	0.24	x	0.7	<u> </u>	· Ē	38.24	(75)
Northeast 0.9x	0.77	x	7.15	X	4	1.38	x	0.24	×	0.7		• [68.89	(75)
Northeast 0.9x	0.77	x	7.15	X	6	7.96	x	0.24	×	0.7		• [113.14	(75)
Northeast 0.9x	0.77	X	7.15	X	9	1.35	x	0.24	x	0.7		Ē	152.08	(75)
Northeast 0.9x	0.77	X	7.15	X	9	7.38	x	0.24	x	0.7	=	• [162.13	(75)
Northeast 0.9x	0.77	X	7.15	X	9	91.1	x	0.24	x	0.7	=	• [151.67	(75)
Northeast 0.9x	0.77	X	7.15	X	7	2.63	x	0.24	x	0.7	=	• [120.91	(75)
Northeast 0.9x	0.77	X	7.15	X	5	0.42	x	0.24	x	0.7	=	• [83.94	(75)
Northeast 0.9x	0.77	X	7.15	x	2	8.07	x	0.24	x	0.7	-	• [46.73	(75)
Northeast 0.9x	0.77	X	7.15	X	1	14.2	x	0.24	x	0.7	-	• [23.64	(75)
Northeast 0.9x	0.77	X	7.15	x	9	9.21	x	0.24	x	0.7	=	- [15.34	(75)
Southwest _{0.9x}	0.77	X	2.19	x	3	6.79]	0.24	х	0.7	=	· [9.38	(79)
Southwest _{0.9x}	0.77	X	0.75	×	3	6.79		0.24	×	0.7		• [3.21	(79)
Southwest _{0.9x}	0.77	X	2.19	×	6	2.67]	0.24	x	0.7		• [15.98	(79)
Southwest _{0.9x}	0.77	x	0.75	x	6	2.67	ĺ	0.24	x	0.7	=	• [5.47	(79)
Southwest _{0.9x}	0.77	x	2.19	×	8	5.75	ĺ	0.24	x	0.7		Ē	21.86	(79)
Southwest _{0.9x}	0.77	x	0.75	×	8	5.75	ĺ	0.24	×	0.7		Ē	7.49	(79)
Southwest _{0.9x}	0.77	x	2.19	×	10	06.25	ĺ	0.24	x	0.7	<u> </u>	Ē	27.09	(79)
Southwest _{0.9x}	0.77	x	0.75	x	10	06.25	ĺ	0.24	x	0.7	<u> </u>	· Ē	9.28	(79)
Southwest _{0.9x}	0.77	x	2.19	×	1	19.01	ĺ	0.24	x	0.7	╡:	• Ē	30.34	(79)
Southwest _{0.9x}	0.77	x	0.75	x	1	19.01	ĺ	0.24	x	0.7	<u> </u>	Ē	10.39	(79)
Southwest _{0.9x}	0.77	x	2.19	×	1	18.15	ĺ	0.24	x	0.7	╡ =	•	30.12	(79)
Southwest _{0.9x}	0.77	x	0.75	x	1	18.15	ĺ	0.24	x	0.7	╡:	•	10.32	(79)
Southwest _{0.9x}	0.77	x	2.19	×	1	13.91	Ī	0.24	×	0.7	╡ =	• [29.04	(79)
Southwest _{0.9x}	0.77	X	0.75	×	11	13.91]	0.24	×	0.7		• [9.95	(79)
Southwest _{0.9x}	0.77	x	2.19	X	10	04.39]	0.24	×	0.7		• [26.62	(79)
Southwest _{0.9x}	0.77	x	0.75	×	10	04.39		0.24	×	0.7		• [9.12	(79)
Southwest _{0.9x}	0.77	X	2.19	X	9	2.85]	0.24	×	0.7		• [23.67	(79)
Southwest _{0.9x}	0.77	x	0.75	×	9	2.85	Ī	0.24	×	0.7	╗ -	• [8.11	(79)
Southwest _{0.9x}	0.77	x	2.19	×	6	9.27		0.24	×	0.7		• [17.66	(79)
Southwest _{0.9x}	0.77	X	0.75	X	6	9.27]	0.24	×	0.7		• [6.05	(79)
Southwest _{0.9x}	0.77	x	2.19	×	4	4.07	Ī	0.24	×	0.7	╗ -	• Ē	11.24	(79)
Southwest _{0.9x}	0.77	x	0.75	x	4	4.07	ĺ	0.24	x	0.7	<u> </u>	· Ē	3.85	(79)
Southwest _{0.9x}	0.77	x	2.19	×	3	1.49	ĺ	0.24	x	0.7	╡:	• Ē	8.03	(79)
Southwest _{0.9x}	0.77	x	0.75	×	3	1.49	ĺ	0.24	x	0.7	-	• Ē	2.75	(79)
												_		_
Solar gains i	n watts, calcul	lated	for each mo	nth_			(83)m	= Sum(74)m .	(82)m		•	_		
(83)m= 31.38		.24	149.51 192		02.57	190.66	156	.65 115.73	70.44	38.72	26.12			(83)
	internal and		` 									_		
(84)m= 374.88	3 401.44 429	9.62	464.25 490	.88 4	84.37	461.76	432	.76 400.27	371.8	359.4	361.08	3		(84)

7. <u>M</u> e	an inter	nal temp	perature	(heating	season)								
				· ·	n the livii	•	from Tab	ole 9, Th	1 (°C)				21	(85)
		•	•		ea, h1,m	_		,	. ,					`
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.99	0.98	0.94	0.83	0.69	0.74	0.91	0.98	0.99	1		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.4	19.53	19.78	20.15	20.53	20.82	20.94	20.92	20.69	20.23	19.76	19.38		(87)
Temp	erature	during h	eating p	eriods ir	rest of	dwelling	from Ta	ble 9, T	h2 (°C)					
(88)m=	19.7	19.7	19.7	19.71	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilisa	Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)													
(89)m=	1	0.99	0.99	0.97	0.9	0.74	0.53	0.58	0.85	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)	-	-		
(90)m=	17.61	17.79	18.16	18.7	19.23	19.6	19.7	19.69	19.46	18.83	18.14	17.58		(90)
									f	LA = Livin	g area ÷ (4) =	0.26	(91)
Mean	Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$													
(92)m=	18.07	18.24	18.58	19.07	19.56	19.91	20.02	20.01	19.77	19.19	18.55	18.04		(92)
		nent to t		<u> </u>	l I temper	ı ature fro	ı m Table	4e. whe	ere appro	noriate	l	<u> </u>		
(93)m=	18.07	18.24	18.58	19.07	19.56	19.91	20.02	20.01	19.77	19.19	18.55	18.04		(93)
		tina real	uirement											
•	Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate													
	the utilisation factor for gains using Table 9a													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:	_						_			
(94)m=	0.99	0.99	0.98	0.96	0.9	0.75	0.57	0.62	0.86	0.96	0.99	0.99		(94)
Usefu	ıl gains,	hmGm	W = (94)	4)m x (8	4)m					-	-	-		
(95)m=	372.26	397.41	421.86	444.95	439.91	365.46	262.04	269.86	343.42	358.7	355.2	358.92		(95)
Mont	hly aver	age exte	rnal tem	perature	from Ta	able 8				_				
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1134.95	1097.3	992.05	828.64	639.04	428	275.77	290.3	459.02	698.18	934.59	1133.31		(97)
Spac	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	4 x [(97)m – (95)m] x (4	1)m			
(98)m=	567.44	470.32	424.22	276.26	148.16	0	0	0	0	252.57	417.16	576.14		
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	3132.28	(98)
Spac	e heatin	g require	ement in	kWh/m²	²/year								56.33	(99)
8c. S	pace co	oling red	quiremer	nt										
Calcu	lated fo	r June, c	July and	August.	See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	757.83	596.59	611.66	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.72	0.81	0.77	0	0	0	0		(101)
												<u> </u>		

Useful loss, hmLm (Watts) = (100)m x (101)m		
	472.55 0 0 0 0 (1	02)
Gains (solar gains calculated for applicable weather region, see	Table 10)	
	,	03)
Space cooling requirement for month, whole dwelling, continuous set (104)m to zero if (104)m < 3 × (98)m	$(kWh) = 0.024 \times [(103)m - (102)m] \times (41)m$	
(104)m= 0 0 0 0 0 85.15	67.09 0 0 0	
	10000)	04)
Cooled fraction Intermittency factor (Table 10b)	f C = cooled area \div (4) = 0.68 (1)	05)
(106)m= 0 0 0 0 0.25 0.25	0.25 0 0 0 0	
	Total = Sum(1,04) = 0 (1	06)
Space cooling requirement for month = (104) m × (105) × (106) m		
(107)m= 0 0 0 0 0 14.55	11.46 0 0 0 0 0	07)
Change and ingregation and in UM/h/m²//agr		07)
Space cooling requirement in kWh/m²/year	$(107) \div (4) = 0.47$	08)
9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating	o provided by a community scheme	
Fraction of space heat from secondary/supplementary heating (T	• • • • • • • • • • • • • • • • • • • •	801)
Fraction of space heat from community system 1 – (301) =	1 (3	802)
The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. So		
Fraction of heat from Community CHP		803a)
Fraction of community heat from heat source 2	0.87	803b)
Fraction of total space heat from Community CHP	(302) x (303a) = 0.13	804a)
Fraction of total space heat from community heat source 2	$(302) \times (303b) = 0.87$	804b)
Factor for control and charging method (Table 4c(3)) for commun	ity heating system 1 (3	805)
Distribution loss factor (Table 12c) for community heating system	1.05 (3	806)
Space heating	kWh/year	
Annual space heating requirement	3132.28	
Space heat from Community CHP	(98) x (304a) x (305) x (306) = 427.56 (3	807a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) = 2861.34 (3	807b)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or Appendix E) 0 (3	808
Space heating requirement from secondary/supplementary syste	m $(98) \times (301) \times 100 \div (308) = 0$ (3	809)
Water heating		
Annual water heating requirement	1882.19	
If DHW from community scheme: Water heat from Community CHP	(64) x (303a) x (305) x (306) = 256.92 (3	310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) = 1719.38 (3	310b)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] = 52.65 (3	313)
Cooling System Energy Efficiency Ratio	4.73 (3	314)
	·	

Space cooling (if there is a fixed cooling s	system, if not enter 0)	= (107) ÷ (314)	=	Г	5.5	(315)
Electricity for pumps and fans within dwe		, , , ,				」 ` ′
mechanical ventilation - balanced, extrac	· ,	tside			92.61	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b)	o) + (330g) =		92.61	(331)
Energy for lighting (calculated in Append	x L)				254.67	(332)
Electricity generated by PVs (Appendix N	1) (negative quantity)				-118.8	(333)
Electricity generated by wind turbine (App	pendix M) (negative quant	tity)			0	(334)
12b. CO2 Emissions – Community heating	ng scheme					7
Electrical efficiency of CHP unit				Ļ	30.6	<u>(361)</u>
Heat efficiency of CHP unit		_		L	63	(362)
		Energy kWh/year	Emission fact kg CO2/kWh		nissions j CO2/year	
Space heating from CHP) (307a) × 100 ÷ (362) =	678.66 ×	0.22		146.59	(363)
less credit emissions for electricity -(307	a) × (361) ÷ (362) =	207.67 ×	0.52		-107.78	(364)
Water heated by CHP (310a) × 100 ÷ (362) =	407.81 ×	0.22		88.09	(365)
less credit emissions for electricity -(310	a) x (361) ÷ (362) =	124.79 ×	0.52		-64.77	(366)
Efficiency of heat source 2 (%)	If there is CHP using tw	o fuels repeat (363) to	(366) for the second	d fuel	96.7	(367b)
CO2 associated with heat source 2	[(307b)+(310	0b)] x 100 ÷ (367b) x	0.22	=	1023.2	(368)
Electrical energy for heat distribution	[(31	3) x	0.52	=	27.33	(372)
Total CO2 associated with community sy	stems (363	3)(366) + (368)(372	()	=	1112.66	(373)
CO2 associated with space heating (second	ondary) (309	9) x	0	=	0	(374)
CO2 associated with water from immersion	on heater or instantaneou	s heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and wa	ter heating (373	3) + (374) + (375) =			1112.66	(376)
CO2 associated with space cooling	(315	5) x	0.52	=	2.86	(377)
CO2 associated with electricity for pumps	s and fans within dwelling	(331)) x	0.52	=	48.06	(378)
CO2 associated with electricity for lighting	g (332	2))) x	0.52	=	132.18	(379)
Energy saving/generation technologies (3 Item 1	333) to (334) as applicable	e	0.52 x 0.0	1 =	-61.66	(380)
Total CO2, kg/year	sum of (376)(382) =				1234.1	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				22.19	(384)
El rating (section 14)					83.56	(385)

APPENDIX B – OVERHEATING REPORT

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Planning Statement Overheating Analysis Arthur Stanley House

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Assessment information	Prepared by:	Quality assured by:				
	Eduard Lloret	Panayiota Paraskeva				
Disclaimer		Eight Associates. By receiving the report and acting on it, the on it - accepts that no individual is personally liable in contract, including negligence).				
Contents		1				
	Passive Design Measure Summary of results					

Introduction Overheating Analysis Arthur Stanley House

Introduction	Eight Associates has been appointed to undertake an overheating analysis for two duplex ground floor units of the Arthur Stanley house scheme in order to provide design stage guidance and maximise the occupant comfort level. Thermal modelling has been undertaken to demonstrate compliance with CIBSE TM52 and TM59 requirements. The current proposal plans to minimise overheating risk by following the Cooling Hierarchy.
Building Summary	The project consists of the development of a 5-storey residential building in the London Borough of Camden to create 10 residential units (including two affordable duplex units). The overheating analysis is performed for the two duplex units, which have a total gross internal area of approximately 220 m ² .
Planning Context	The London Borough of Camden does not set out any specific requirement for avoiding overheating. This report is aligned with national standards and regulations.
Methodology	The methodology used within this report is used to establish the thermal comfort levels in occupied spaces, through the use of a dynamic simulation and a response with suitable passive design measures to mitigate solar gains, provide adequate ventilation and increase thermal mass. National regulations have set high standards and numerous iterations have been undertaken to determine suitable fabric improvements. All assumptions used in the modelling are provided in the model inputs section of this report.
	Please note that the climate change scenario has been excluded from this report. Note that external temperatures are likely to increase because of climate change. The consequences of increased summer peak temperatures could be non-compliance with the thermal comfort recommendations unless further measures were implemented.
Criteria for defining overheating	According to the CIBSE TM 52 – The limits of thermal comfort: avoiding overheating in

According to the CIBSE TM 52 – The limits of thermal comfort: avoiding overheating in European buildings (2013) and CIBSE Guide A – Environmental Design (2015), to reduce the risk of overheating the space has to comply with at least two of the following three criteria:

- a. The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1 K or more, during the occupied hours of a typical non-heating season (1 May to 30 September).
- b. The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and its duration. This criterion sets a daily limit for acceptability.
- c. The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

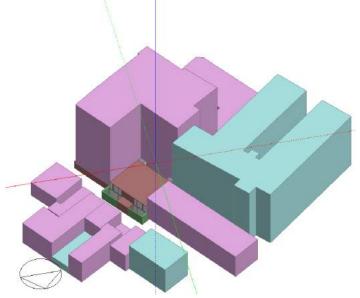
According to the CIBSE TM59: 2017 – Design methodology for the assessment of overheating risk in homes, to reduce the risk of overheating the space has to comply with the following criteria:

- a. For living rooms, kitchen and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive, shall not be more than 3 per cent of occupied hours (Same as Criterion 1 of TM52).
- b. For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of the annual hours (1% of the annual hours between 22:00 and 07:00).

Model Input Overheating Analysis Arthur Stanley House

Simulation Software

An overheating analysis has been undertaken using Dynamic Simulation Modelling, using Design Builder software. Design Builder is a DCLG approved simulation environment that complies with the requirements of CIBSE Guide A. A screenshot of the model is shown below.



Weather File

The CIBSE Design Summer Year (DSY) Current Series, London Heathrow, has been used for the purposes of this report.

Building Fabric U-Values

Element	Proposed U-value (W/m ² K)
External walls	0.15
Ground floors	0.11
Roof	0.15
Openings	1.20

Internal Gains

Typical hours based on the relative activity for class use, on weekdays and weekends throughout the year have been specified for lighting, equipment and occupancy.

Space	Occupancy people/m²	Lighting W/m²	Small power W/m²
Bedroom	0.12 – 0.16	2	5.82 – 11.18
Kitchen	0.24	2	24.0
Living room	0.19	2	9.4

Passive Design Measure Overheating Analysis Arthur Stanley House

Cooling Hierarchy	 conditioning systems and demonstrate Minimise internal heat gener Reduce the amount of heat effenestration, insulation and g Manage the heat within the localings; Passive ventilation; 	reduce potential overheating and reliance on air e this in accordance with the following cooling hierarchy: ation through energy efficient design; entering a building in summer through shading, albedo, treen roofs and walls; building through exposed internal thermal mass and high					
	5. Mechanical ventilation;6. Active cooling systems (ensured)	uring they are the lowest carbon options).					
Cooling Strategy	The cooling strategy is to implement energy efficient lighting and appliances to reduce internated fabric, solar control glazing to keep the heat out and openable windows to purge out the excess heat.						
Windows	Glazing will be a crucial aspect to ensure thermal comfort of the occupied spaces. In order to minimise solar gains, and consequently cooling demand, windows with a solar factor of 0.24 have been modelled for every glazed area.						
Mechanical Ventilation Rates		very and summer by pass has been specified. The 1 l/s (three-bedroom flats, as per Part F).					
Natural Ventilation Rates	has been calculated by the software a	as been adopted for this scheme. The ventilation rate ccording to the percentage of openable windows for ental conditions throughout the year. This percentage of as follows:					
	Space	Glazing openable area					
	Living room	30%					
	Kitchen	30%					
	Double Bedroom 1	70%					
	Double Bedroom 2	30%					
	Single bedroom	90%					

when the rooms were occupied.

Summary of results Overheating Analysis Arthur Stanley House

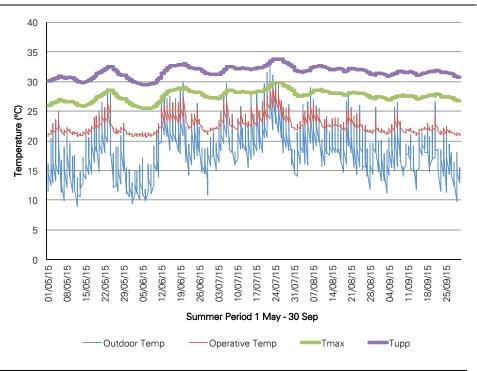
Overview of Results

In the graphs below, the outdoor and indoor temperatures of a typical living room and bedroom are presented. The graphs also show T_{max} and T_{upp} , which are the temperature of upper range of thermal comfort and the temperature of absolute upper limit of thermal comfort, respectively.

In order to comply with the overheating criteria the building must comply with two of the following three criteria (Criterion 1 to Criterion 3). All bedrooms should comply with criterion 4.

- Criterion 1 The percentage of hours with a higher temperature than T_{max} should be less than 3%
- Criterion 2 The weighted exceedance shall be less than or equal to 6 in any one day.
- Criterion 3 No occupied hours of the building shall exceed the absolute upper limit temperature. $(T_{upp} = T_{max} + 4K)$.
- Criterion 4 For bedrooms only: The operative temperature in bedrooms from 10 pm to 7 am shall not exceed 26°C for more than 1% of the hours

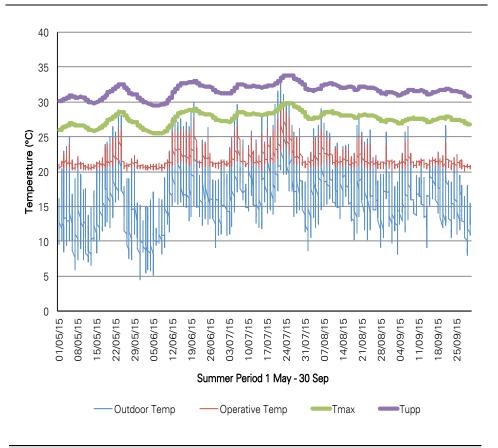
Duplex 1 – Living Room



Criterion 1	Criterion 2	Criterion 3	Criterion 4	Compliance
0.0	0.0	0.0	-	PASS

Summary of results Overheating Analysis Arthur Stanley House

Duplex 1 – Single Bedroom



Criterion 1	Criterion 2	Criterion 3	Criterion 4	Compliance
0.0	0.0	0.0	0.4	PASS

Summary of results Overheating Analysis Arthur Stanley House

Summary	y of F	Resu	ts

Room	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Compliance
Duplex 1 – Ground Floor – Kitchen	0.1	1.0	0.0	-	PASS
Duplex 1 – Ground Floor – Living	0.0	0.0	0.0	-	PASS
Duplex 1 – Basement – Bedroom 1	0.0	0.0	0.0	0.2	PASS
Duplex 1 – Basement – Bedroom 2	0.0	0.0	0.0	0.2	PASS
Duplex 1 – Ground Floor – Single Bedroom	0.0	0.0	0.0	0.4	PASS
Duplex 1 – Ground Floor – Kitchen	0.2	2.0	0.0	-	PASS
Duplex 1 – Ground Floor – Living	0.0	0.0	0.0	-	PASS
Duplex 1 – Basement – Bedroom 1	0.0	0.0	0.0	0.2	PASS
Duplex 1 – Basement – Bedroom 2	0.0	0.0	0.0	0.3	PASS
Duplex 1 – Ground Floor – Single Bedroom	0.0	0.0	0.0	0.3	PASS

Summary of results Overheating Analysis Arthur Stanley House

Explanation of Results

Criterion 1 shows that the scheme will experience temperatures above the thermal comfort T_{max} for less than 3%.

Criterion 2 shows that the maximum weighted exceedance does not exceed 6.

Criterion 3 shows that there are no hours above the absolute maximum daily temperature.

Criterion 4 shows that bedrooms will experience temperatures above 26°C for less than 1% (between 10pm to 7am).

Please note that according to CIBSE TM52, the space has to comply with at least two of the three criteria. According to CIBSE TM59, the dwelling should comply with both criterion 1 and criterion 4. Therefore, all assessed rooms comply with the overheating requirements.

Conclusions Overheating Analysis Arthur Stanley House

Conclusions

The proposal has responded to CIBSE TM52 and CIBSE TM59 requirements relating to overheating. The report has set out how the occupied spaces perform against strict thermal comfort standards for overheating. The scheme has implemented passive design measures and the modelling results indicate that the scheme is compliant with the overheating requirements.

The proposal maximises passive design measures by responding to the local context in the following ways:

- Energy efficiency lighting and appliances have been recommended to reduce internal heat gains;
- The building fabric will be insulated over and above the standards set out by Building Regulations, and the solar gains will be reduced with a glazing solar factor of 0.24, in order to keep the heat out of the building;
- Mechanical ventilation with heat recovery and summer bypass to provide fresh air and purge the heat out;
- Natural ventilation supply fresh air to the building through windows (as per ventilation rates section)

Note that the analysis was performed assuming that opening windows were controlled based on the level of occupancy and the operative indoor temperature of the space. To achieve the thermal comfort levels shown in this report the level of occupant control for the opening windows would need to be optimum i.e. fully responsive to indoor temperature.