				User D	etails:						
Assessor Name: Software Name:	Stroma FS	AP 2012			Strom Softwa	are Vei	sion:		Versio	n: 1.0.4.14	
			P	roperty .	Address	: Flat 0-0)3 Duple	X			
Address : 1. Overall dwelling dime	nsions:										
	13013.			Area	a(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Basement					52	(1a) x	r	.25	(2a) =	169	(3a)
Ground floor					41	(1b) x	3.	.15	(2b) =	129.15] (3b)
Total floor area TFA = (1)	a)+(1b)+(1c)+	(1d)+(1e)	+(1r	n)	93	(4)]]
Dwelling volume	, , , , , ,	. , . ,	,	,)+(3c)+(3d)+(3e)+	.(3n) =	298.15	(5)
-].,
2. Ventilation rate:	main		condar	у	other		total			m ³ per hour	
Number of chimneys	heating	h€ +	eating 0	┐ + ┌	0	7 = Г	0	x 4	40 =	0	(6a)
Number of open flues	0		0	 +	0	」 L ヿ = Г	0	x 2	20 =	0](6b)
Number of intermittent fa			•		•		0	x 1	10 =	0](7a)
Number of passive vents							0	x 1	10 =	0	(7b)
Number of flueless gas fi							0	x 4	40 =	0	(7c)
						L	0		Air ch	anges per hou	1
Infiltration due to chimner	7						0		÷ (5) =	0	(8)
If a pressurisation test has b Number of storeys in th			d, procee	d to (17), d	otherwise o	continue fr	om (9) to (16)		0	(9)
Additional infiltration	ie dw <mark>einig</mark> (n.)						[(9)-	-1]x0.1 =	0	(3)
Structural infiltration: 0	.25 for steel o	r timber fr	rame or	0.35 fo	r masoni	y constr	uction		-	0	(11)
if both types of wall are pl			onding to	the great	er wall are	a (after					-
deducting areas of openin If suspended wooden f			ed) or 0.	1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en		·	,	,	,,					0	(13)
Percentage of windows	s and doors di	aught str	ipped							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,	•			•	•	•	etre of e	nvelope	area	4	(17)
If based on air permeabil	-									0.2	(18)
Air permeability value applie Number of sides sheltere		on test has	been don	e or a deg	gree air pe	rmeability	is being us	sed		0	(19)
Shelter factor					(20) = 1 -	[0.075 x (1	9)] =			1	(10)
Infiltration rate incorporat	ing shelter fac	tor			(21) = (18) x (20) =				0.2	(21)
Infiltration rate modified f	or monthly wir	nd speed							ļ		-
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Tab	e 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 I	Factor (2	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]	
Adjust	ed infiltr	ation rat	e (allowi	ng for sl	nelter an	nd wind s	speed) =	: (21a) x	(22a)m				-	
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24		
		<i>ctive air</i> al ventila	change i	rate for t	he appli	cable ca	ise		-					(220)
			using Appe	endix N. (2	² 3b) = (23a	a) x Fmv (e	equation (N5)), othe	rwise (23ł	(23a) = (23a)			0.5	(23a) (23b)
			overy: effici) (200)			0.5 76.5	(230) (23c)
			-	-	-					2h)m + ((23h) x [1 – (23c)		(200)
(24a)m=	r	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35]	(24a)
		d mech	anical ve	ntilation	without	heat red	L Coverv (I	1 MV) (24t	m = (2)	1 2b)m + ((23b)		I	
(24b)m=		0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If	whole h	ouse ex	tract ven	tilation of	or positiv	/e input v	ventilatio	on from (outside		1	I	1	
	if (22b)n	n < 0.5 ×	< (23b), t	hen (24	c) = (23k	o); other	wise (24	c) = (22	b) m + 0	.5 × (23k	o)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
			on or wh en (24d)							0.5]				
(24d) <mark>m=</mark>	= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24) or (24	c) or (24	ld) in bo	x (25)					
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
3 He	at losse	s and he	eat l <mark>oss</mark> p	paramet	er.									
		Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	÷	AXk
			(m²)	'n	-	A ,r		W/m2		(W/		kJ/m²·l		kJ/K
Doo <mark>rs</mark>						1.8	x	1.3	=	2.34				(26)
Windo	ws Type	e 1				7.22	x1	/[1/(1.1)+	0.04] =	7.61				(27)
Windo	ws Type	92				12.1	x1	/[1/(1.1)+	0.04] =	12.75				(27)
Windo	ws Type	e 3				8.83	x1	/[1/(1.1)+	0.04] =	9.3				(27)
Windo	ws Type	e 4				5.27	×1	/[1/(1.1)+	0.04] =	5.55				(27)
Floor						52	x	0.12	=	6.24				(28)
Walls	Type1	42.2	25	19.3	2	22.93	3 X	0.15	=	3.44			7	(29)
Walls	Type2	37.	8	14.1		23.7	x	0.15	=	3.56			╕	(29)
Walls	Туре3	17.5	55	1.8		15.75	5 X	0.17	=	2.63	i F		\exists	(29)
Walls	Type4	10.4	4	0		10.4	×	0.17	= =	1.75	= i			(29)
Total a	area of e	elements	s, m²			160								(31)
			ows, use e sides of in				lated using	g formula 1	1/[(1/U-vali	ue)+0.04] a	as given in	paragraph	ı 3.2	
			= S (A x		,			(26)(30) + (32) =				55.16	(33)
Heat c	apacity	Cm = S((A x k)						((28).	(30) + (3	2) + (32a)	(32e) =	13566.2	2 (34)

Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Indicative Value: Medium

(35)

250

Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix I	<						10.43	(36)
	<i>of therma</i> abric he	al bridging at loss	are not kn	own (36) =	= 0.15 x (3	1)			(33) +	(36) =			65.6	(37)
		at loss ca	alculated	l monthly	v						(25)m x (5)		05.0	(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(38)m=	36.65	36.16	35.67	33.21	32.71	30.25	30.25	29.76	31.24	32.71	33.7	34.68		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m		_	
(39)m=	102.25	101.76	101.26	98.8	98.31	95.85	95.85	95.36	96.84	98.31	99.3	100.28		_
Heat lo	oss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	98.68	(39)
(40)m=	1.1	1.09	1.09	1.06	1.06	1.03	1.03	1.03	1.04	1.06	1.07	1.08]	
Nhuasha			th (Tab					•	,	Average =	Sum(40)1	12 /12=	1.06	(40)
NUMDE	Jan	/s in mor Feb	nth (Tab Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
			<u> </u>		<u> </u>	<u> </u>	I				<u> </u>		1	
4. Wa	ater heat	ting ener	rgy requi	rement:								kWh/y	ear:	
Assum		ipancy, I	N									00	1	(42)
if TF	A > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TF <mark>A -1</mark> 3.	.9)	66		(42)
	A £ 13.9		ator upor	no in litro	o por de	v Vd ov	orogo	(25 x N)	1.26				,	(42)
								to achieve		se target o		.48	J	(43)
not more	e that 125	litres pe <mark>r</mark> l	person pei	[.] day (all w	ater use, l	hot and co	ld)						,	
Hotwat	Jan	Feb	Mar dov for or	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		n litres per	-					· ·	05.52	00.42	402.00	407.00	1	
(44)m=	107.23	103.33	99.43	95. <mark>5</mark> 3	91.64	87.74	87.74	91.64	95.53	9 <mark>9.43</mark> Total = Su	103.33 m(44) ₁₁₂ =	107.23	1169.81	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600						
(45)m=	159.02	139.08	143.52	125.12	120.06	103.6	96	110.17	111.48	129.92	141.82	154.01		_
lf instan	taneous w	vater heatii	na at point	of use (no	o hot water	^r storaae).	enter 0 in	boxes (46)		Total = Su	m(45) ₁₁₂ =	=	1533.81	(45)
(46)m=	23.85	20.86	21.53	18.77	18.01	15.54	14.4	16.52	16.72	19.49	21.27	23.1	1	(46)
	storage			-			<u> </u>		-		ļ	_	1	
-		. ,					-	within sa	ame ves	sel		2]	(47)
	•	eating a			-			ı (47) ombi boile	ore) onto	or 'O' in ((17)			
	storage		not wate	: (uns n	iciuues i	1151011101					47)			
	-	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Tempe	erature f	actor fro	m Table	2b								0]	(49)
		m water	-					(48) x (49)	=			2]	(50)
		urer's de age loss		•							0	03	1	(51)
		eating s			, ,		.,				.		1	x- 7
		from Tal		0 h								91	•	(52)
rempe	erature f	actor fro	m lable	∠D							0	.6		(53)

0.		om wateı (54) in (5	•	e, kWh/y₀	ear			(47) x (51)) x (52) x (53) =		13		(54) (55)
	. ,	loss cal		for each	month			((56)m = (55) × (41)ı	m	0.	15		(00)
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
			-				H11)] ÷ (5	-		-			l lix H	(00)
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
Primar	v circuit	t loss (ar	nual) fro	om Table	• • 3							0		(58)
	-					59)m =	(58) ÷ 36	65 × (41)	m					
(mo	dified by	/ factor f	rom Tab	le H5 if t	here is s	solar wa	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) ÷ 3	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	neat req	uired 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=	186.35	163.77	170.85	151.57	147.39	130.05	123.33	137.49	137.93	157.25	168.26	181.33		(62)
Solar DI	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	I lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter											
(64)m=	186.35	163.77	170.85	151.57	147.39	130.05	123.33	137.49	137.93	157.25	168.26	181.33		_
								Outp	out from wa	ater heate	r (annual)₁	12	1855.57	(64)
Hea <mark>t g</mark>	l <mark>ain</mark> s fro	m water	heating	, kWh/m	onth 0.2	5 [′] [0.85	× (45)m	ı + (61)m	n] + 0.8 x	(<mark>46)m</mark>	+ (57)m	+ (<mark>59)</mark> m]	
(65)m=	74.74	65.99	69.58	62.76	61.78	55.61	53.78	58.49	58.22	65.06	68.31	73.07		(65)
inclu	ude (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	eating	
5. Int	ternal ga	ains (see	e Table 8	5 and 5a):									
Metab	olic gair	ns (Table	e 5), Wat	ts				_				_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	133.23	133.23	133.23	133.23	133.23	133.23	133.23	133.23	133.23	133.23	133.23	133.23		(66)
Lightin	ig gains	(calcula	ted in A	opendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5		-	-		
(67)m=	21.8	19.36	15.74	11.92	8.91	7.52	8.13	10.56	14.18	18	21.01	22.4		(67)
Applia	nces ga	ins (calc	ulated ir	n Appeno	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	244.49	247.03	240.63	227.02	209.84	193.69	182.91	180.37	186.76	200.37	217.55	233.7		(68)
Cookir	ng gains	(calcula	ated in A	ppendix	L, equa	tion L15	or L15a)), also se	ee Table	5				
(69)m=	36.32	36.32	36.32	36.32	36.32	36.32	36.32	36.32	36.32	36.32	36.32	36.32		(69)
Pumps	s and fa	ns gains	(Table :	5a)										
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses	s e.g. ev	vaporatio	on (nega	tive valu	es) (Tab	ole 5)								
(71)m=	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58	-106.58		(71)
Water	heating	gains (1	able 5)											
(72)m=	100.45	98.2	93.53	87.17	83.04	77.23	72.29	78.62	80.87	87.45	94.88	98.21		(72)
Total i	internal	gains =				(66))m + (67)m	n + (68)m -	+ (69)m + ((70)m + (7	1)m + (72)	m	-	
(73)m=	429.71	427.56	412.87	389.08	364.76	341.42	326.29	332.52	344.78	368.8	396.42	417.28		(73)
6. So	lar gain	s:												

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	7.22	x	11.28	x	0.5	x	0.85	=	23.99	(75)
Northeast 0.9x	0.77	x	5.27	x	11.28	x	0.5	x	0.85	=	17.51	(75)
Northeast 0.9x	0.77	x	7.22	x	22.97	x	0.5	x	0.85	=	48.84	(75)
Northeast 0.9x	0.77	x	5.27	x	22.97	x	0.5	x	0.85	=	35.65	(75)
Northeast 0.9x	0.77	x	7.22	x	41.38	x	0.5	x	0.85	=	87.99	(75)
Northeast 0.9x	0.77	x	5.27	x	41.38	x	0.5	x	0.85	=	64.23	(75)
Northeast 0.9x	0.77	x	7.22	x	67.96	x	0.5	x	0.85	=	144.51	(75)
Northeast 0.9x	0.77	x	5.27	x	67.96	x	0.5	x	0.85	=	105.48	(75)
Northeast 0.9x	0.77	x	7.22	x	91.35	x	0.5	x	0.85	=	194.24	(75)
Northeast 0.9x	0.77	x	5.27	x	91.35	x	0.5	x	0.85	=	141.78	(75)
Northeast 0.9x	0.77	x	7.22	x	97.38	x	0.5	x	0.85	=	207.09	(75)
Northeast 0.9x	0.77	x	5.27	x	97.38	x	0.5	x	0.85	=	151.15	(75)
Northeast 0.9x	0.77	x	7.22	x	91.1	x	0.5	x	0.85	=	193.72	(75)
Northeast 0.9x	0.77	x	5.27	x	91.1	x	0.5	x	0.85	=	141.4	(75)
Northeast 0.9x	0.77	x	7.22	x	72.63	x	0.5	x	0.85	=	154.44	(75)
Northeast 0.9x	0.77	x	5.27	×	72.63	x	0.5	х	0.85	=	112.73	(75)
Northeast 0.9	0.77	x	7.22	x	50.42	x	0.5	x	0.85	-	107.22	(75)
Northeast 0.9x	0.77	x	5.27	х	50.42] ×	0.5	x	0.85	=	78.26	(75)
Northeast 0.9x	0.7 <mark>7</mark>	x	7.22	x	28.07	x	0.5	x	0.85	=	59.68	(75)
Northeast 0.9x	0.77	x	5.27	x	28.07	x	0.5	x	0.85	=	43.56	(75)
Northeast 0.9x	0.77	x	7.22	x	14.2	×	0.5	x	0.85	=	30.19	(75)
Northeast 0.9x	0.77	x	5.27	x	14.2	x	0.5	x	0.85	=	22.04	(75)
Northeast 0.9x	0.77	x	7.22	x	9.21	x	0.5	x	0.85	=	19.59	(75)
Northeast 0.9x	0.77	x	5.27	x	9.21	x	0.5	x	0.85	=	14.3	(75)
Northwest 0.9x	0.77	x	12.1	x	11.28	x	0.5	x	0.85	=	40.21	(81)
Northwest 0.9x	0.77	x	8.83	x	11.28	x	0.5	x	0.85	=	29.34	(81)
Northwest 0.9x	0.77	x	12.1	x	22.97	x	0.5	x	0.85	=	81.85	(81)
Northwest 0.9x	0.77	x	8.83	x	22.97	x	0.5	x	0.85	=	59.73	(81)
Northwest 0.9x	0.77	x	12.1	x	41.38	x	0.5	x	0.85	=	147.46	(81)
Northwest 0.9x	0.77	x	8.83	x	41.38	x	0.5	x	0.85	=	107.61	(81)
Northwest 0.9x	0.77	x	12.1	x	67.96	x	0.5	x	0.85	=	242.18	(81)
Northwest 0.9x	0.77	x	8.83	x	67.96	x	0.5	x	0.85	=	176.73	(81)
Northwest 0.9x	0.77	x	12.1	x	91.35	x	0.5	x	0.85	=	325.53	(81)
Northwest 0.9x	0.77	x	8.83	x	91.35	x	0.5	x	0.85	=	237.56	(81)
Northwest 0.9x	0.77	x	12.1	x	97.38	x	0.5	x	0.85	=	347.05	(81)
Northwest 0.9x		x	8.83	×	97.38	×	0.5	x	0.85	=	253.26	(81)
Northwest 0.9x		x	12.1	x	91.1	×	0.5	x	0.85	=	324.66	(81)
Northwest 0.9x		x	8.83	x	91.1	×	0.5	x	0.85	=	236.92	(81)
Northwest 0.9x	0.77	x	12.1	x	72.63	×	0.5	x	0.85	=	258.82	(81)

						-						_
Northwest 0.9x 0.77	7 X	8.8	33	x	72.63	x	0.5	×	0.85	=	188.88	(81)
Northwest 0.9x 0.77	7 X	12	.1	x	50.42	x	0.5	x	0.85	=	179.69	(81)
Northwest 0.9x 0.77	7 X	8.8	33	x	50.42	x	0.5	×	0.85	=	131.13	(81)
Northwest 0.9x 0.77	7 X	12	.1	x	28.07	x	0.5	x	0.85	=	100.02	(81)
Northwest 0.9x 0.77	7 X	8.8	3	x	28.07	x	0.5	x	0.85	=	72.99	(81)
Northwest 0.9x 0.77	7 X	12	.1	x	14.2	x	0.5	x	0.85	=	50.59	(81)
Northwest 0.9x 0.77	7 X	8.8	3	x	14.2	x	0.5	x	0.85	=	36.92	(81)
Northwest 0.9x 0.77	7 X	12	.1	x	9.21	x	0.5	x	0.85	=	32.84	(81)
Northwest 0.9x 0.77	7 X	8.8	33	x	9.21	x	0.5	x	0.85	=	23.96	(81)
Solar gains in watts, c	alculated	l for eac	h month			(83)m	n = Sum(74)m	n(82)m				
(83)m= 111.06 226.06	407.29	668.89	899.12	958.56	896.71	714	.87 496.29) 276.27	139.74	90.7		(83)
Total gains – internal	and solar	(84)m =	= (73)m ·	+ (83)m	n, watts			•	•	•	1	
(84)m= 540.77 653.62	820.16	1057.97	1263.88	1299.9	7 1223	1047	7.39 841.07	645.06	536.16	507.98		(84)
7. Mean internal tem	nerature	(heating	season)	•	•	-	•	•	•		
Temperature during		` ĭ		, 	from To	bla Q	Th1 (°C)				21	(85)
				0			, (0)				21	(00)
Utilisation factor for g				r`	1				Neu	Dee	1	
Jan Feb	Mar	Apr	May	Jun	Jul		ug Sep		Nov	Dec		(00)
(86)m= 1 1	0.98	0.89	0.68	0.47	0.34	0.4	0.73	0.97	1	1		(86)
Me <mark>an int</mark> ernal tempe	rature in	living are	ea T1 <mark>(fo</mark>	ollow st	eps 3 to	7 in T	able 9c)					
(87)m= 19.81 19.99	20.32	20.74	20.95	20.99	21	2	1 20.95	20.59	20.13	19.8		(87)
Temperature during	heating p	eriods ir	n rest of	dwellin	g from Ta	able 9	9, Th2 (°C))				
(88)m= 20 20.01	20.01	20.03	20.04	20.06	20.06	20.			20.03	20.02		(88)
Utilisation factor for	nains for	rest of d	welling	h2 m (s		. () () () () () () () () () () () () ()						
(89)m= 1 0.99	0.97	0.86	0.62	0.4	0.27	0.3	3 0.65	0.95	0.99	1		(89)
	1	1									l	
Mean internal tempe	1		of dweili 19.99	, 	<u> </u>	ri —			40.0	40.4	1	(90)
(90)m= 18.41 18.68	19.16	19.74	19.99	20.05	20.06	20.	06 20.01	19.56	18.9 ing area ÷ (18.4		``
								ILA = LIV	ing alea - (4) =	0.35	(91)
Mean internal tempe	rature (fo	r the wh	ole dwe	lling) =	fLA × T1	+ (1	– fLA) × T	2				
(92)m= 18.91 19.14	19.57	20.1	20.33	20.39	20.39	20.	39 20.34	19.93	19.34	18.9		(92)
Apply adjustment to	the mear	interna	temper	ature fr	om Table	e 4e,	where app	ropriate		-		
(93)m= 18.91 19.14	19.57	20.1	20.33	20.39	20.39	20.	39 20.34	19.93	19.34	18.9		(93)
8. Space heating rec	luirement	:										
Set Ti to the mean ir	iternal ter	nperatu	re obtair	ned at s	tep 11 of	Tabl	e 9b, so th	nat Ti,m=	(76)m an	d re-cald	culate	
the utilisation factor f	or gains	using Ta	ble 9a		_				_	·		
Jan Feb	Mar	Apr	May	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
Utilisation factor for g	gains, hm	:							-	-	1	
(94)m= 1 0.99	0.97	0.86	0.64	0.42	0.3	0.3	0.68	0.95	0.99	1		(94)
Useful gains, hmGm	, W = (94	4)m x (84	4)m						_		1	
(95)m= 539.03 648.01	793.55	910.81	813	551.83	363.11	379	.92 572.62	612.82	532.33	506.79		(95)
Monthly average ext	1			able 8						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)
Heat loss rate for me	an intern	al tempe	erature,	Lm,W	=[(39)m	x [(9	3)m– (96)n	n]	_		1	
(97)m= 1493.5 1449.5	1323.39	1106.29	848.48	554.81	363.44	380	.84 604.58	3 917.1	1215.14	1473.71		(97)

Space heating	g requirer	ment fo	r each m	nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95	5)m] x (4	11)m				
(98)m= 710.13	538.6	394.2	140.75	26.4	0	0	0	0	226.38	491.63	719.3	38		_
							Tota	al per year	(kWh/yea	ar) = Sum(9	8)15,912	2 =	3247.47	(98)
Space heating	g requirer	ment in	kWh/m ²	/year									34.92	(99)
9b. Energy req														
This part is use Fraction of spa	•				-		• •			nunity scł	neme.	Ē	0	(301)
Fraction of spa	ce heat f	rom coi	mmunity	system	n 1 – (30	1) =						F	1	(302)
The community sci	heme may	obtain he	eat from se	veral sou	rces. The	procedure	allows for	CHP and	up to four	other heat	source	es; the	latter	_
includes boilers, he Fraction of hea		-			from powe	er stations.	See Appe	ndix C.				Г	1	(303a)
Fraction of tota					oilers				(302) x (303	a) =		1	(304a)
Factor for conti						or comm	unity hea	ating sys			,	F	1] (305)
Distribution los							-	0,				F	1.05	(306)
Space heating			,			0,						L	kWh/year	
Annual space h	•	equirem	nent										3247.47	
Space heat from	m Comm	unity b	oilers					(98) x (3	04 <mark>a)</mark> x (30	05) x (306)	=		3409.84	(307a)
Efficiency of se	condary/	/supple	mentary	heating	system	in % (fro	om Table	4a or A	.pp <mark>endi</mark> :	× E)			0	(308
Space heating	requirem	ient from	m secon	dary/su	pplemen	ntary sys	tem	(98) x (3	01) x 100	÷ (308) =			0	(309)
Wat <mark>er he</mark> ating														_
Annual water h													1855.57	
If DHW from co Water heat fror								(64) x (3	03a) x (30	05) x (306) :	=	Г	1948.35	(310a)
Electricity used	l for heat	distribu	ution				0.01	× [(307a)	(307e)	+ (310a)((310e)]	=	53.58	(313)
Cooling Systen	n Energy	Efficier	ncy Ratio)								Ē	0	(314)
Space cooling	(if there i	s a fixe	d cooling	g syster	n, if not o	enter 0)		= (107) ÷	- (314) =				0	(315)
Electricity for p mechanical ver							outoido						274.99	(330a)
warm air heatir			eu, exila	act of po		put nom	outside							(330b)
pump for solar	• •												0	(330g)
Total electricity		•	(\\/h/vea	r				-(330a)	+ (330b) .	+ (330g) =			274.99	(331)
Energy for light								-(0000)	(0000)	(000g) –		F	384.93	(332)
12b. CO2 Emis	• •			,	eme									
120. CO2 LINE	5510115 - (Sommu	inity nea	ung son	lenie		Ene	ergy	E	Emission	facto	or Er	nissions	
								h/year		kg CO2/k			g CO2/year	
CO2 from othe Efficiency of he		•		vater he			ig two fuels	s repeat (3	63) to (36	6) for the s	econd	fuel	92	(367a)
CO2 associate		. ,				[(307b)+	- ⊦(310b)] x	100 ÷ (367	ъ)х Г	0.22		=	1258.01](367)
Electrical energ							[(313) x	(Γ Γ	0.52		=	27.81	(372)
							/		L	5.0-				` ´

Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	1285.82	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instar	ntaneous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	vater heating	(373) + (374) + (375) =			1285.82	(376)
CO2 associated with electricity for pum	ps and fans within d	welling (331)) x	0.52	=	142.72	(378)
CO2 associated with electricity for light	ng	(332))) x	0.52	=	199.78	(379)
Total CO2, kg/year	sum of (376)(382) =				1628.32	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				17.51	(384)
El rating (section 14)					84.19	(385)



			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201	2		Stroma Softwa				Versio	n: 1.0.4.14	
		Pro	operty A	Address:	Flat 3-0)1				
Address :										
1. Overall dwelling dime	nsions:			()						
Ground floor			Area	· ·	(4 -)		ight(m)		Volume(m ³	<i>.</i>
		· · · · · ·			(1a) x	3	.15	(2a) =	160.65	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)		51	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	160.65	(5)
2. Ventilation rate:										
		econdary leating		other		total			m ³ per hou	r
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	×	20 =	0	(6b)
Number of intermittent fa	ins					0	x .	10 =	0	(7a)
Number of passive vents	i				Г	0	x	10 =	0	(7b)
Number of flueless gas fi	res				Γ	0	X 4	40 =	0	(7c)
								Air ch	anges per ho	
Infiltration due to chimne						0		÷ (5) =	0	(8)
If a pressurisation test has b		ed, proceed	to (17), o	therwise c	ontinue fro	om (9) to ((16)			_
Number of storeys in the Additional infiltration	he dwelling (ns)						[(0)	11-0.1	0	(9)
Structural infiltration: 0	25 for steel or timber f	frame or () 35 for	masonr	v constr	uction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corresp				•	uction			0	
deducting areas of openii			<i>,</i> .							_
If suspended wooden f		ed) or 0.1	(seale	d), else (enter 0				0	(12)
If no draught lobby, en		rinnad							0	(13)
Percentage of windows Window infiltration	s and doors draught st	nppeu		0.25 - [0.2	x (14) - 1	001 =			0	(14)
Infiltration rate				(8) + (10) -		-	+ (15) =		0	(15)
Air permeability value,	a50 expressed in cub	oic metres						area	4	(17)
If based on air permeabil			•	•	•				0.2	(18)
Air permeability value applie	•					is being u	sed		0.2	
Number of sides sheltere	ed .								0	(19)
Shelter factor				(20) = 1 - [0.075 x (1	9)] =			1	(20)
Infiltration rate incorporat	ing shelter factor			(21) = (18)	x (20) =				0.2	(21)
Infiltration rate modified f	or monthly wind speed	1							1	
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		
	i i	• • • •	I	I			•	•		

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m			-		
.	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se						0.5	
				endix N, (2	3h) - (23a) v Emv (e	auation (N	(5)) other	wise (23h) - (23a)			0.5	(23a)
				iency in %) – (200)			0.5	(23b)
			-	-	-					2 15)		(00 -)	76.5	(23c)
	r		i					<i>,</i> ,	, <u> </u>	r í í	r <u> </u>	· · · ·	÷ 100]	(24a)
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(24a)
	r		1	entilation			· · ·	<i>,</i> ,	, ,	, <u>,</u>	<u> </u>		l	(24b)
(24b)m=		0	0	0	0	0	0	0	0	0	0	0		(24b)
,				ntilation o then (240	•	•				E v (22h				
(24c)m=	r í	0			(230) = (230)			C) = (ZZL)	0 0	0	0	0		(24c)
				-	-	-	-	-	-	0	0	0		(240)
,				ole hous $m = (22k)$	•	•				0.5]				
(24d)m=	<u> </u>	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t) or (24	c) or (24	d) in boy	(25)					
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
				paramete										
ELEN		Gros area		Openin m		Net Ar A ,n		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·l		A X k kJ/K
Doors						1.8	x	1.3	= [2.34				(26)
Windo	ws Type	e 1				7.91	x1/	/[1/(1.1)+	0.04] =	8.33	F			(27)
	ws Type					4.25		/[1/(1.1)+	Ļ	4.48	Ħ			(27)
	ws Type					4.46		/[1/(1.1)+	L	4.7	6			(27)
Walls									I		╡╷			
		52.9		16.62	2	36.28		0.15		5.44	╡╎		\dashv	(29)
Walls	rypez	4.73	3	1.8		2.93	×	0.17	= [0.49			\dashv	(29)
Roof		83		0		83	X	0.12	=	9.96				(30)
Total a	area of e	elements	, m²			140.6	3							(31)
				effective wi Internal wall			ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
		ss, W/K :			s anu pan			(26)(30)	+ (32) =				35.74	(33)
		Cm = S(•	0)				(-/ (/		(30) + (32	(32a)	(32e) -		(34)
				⁻ = Cm ÷	TEA) ir	k l/m²k				tive Value		(020) =	7845.3	
		•		tails of the				eciselv the				able 1f	250	(35)
	•	ad of a de			00110110101	en al e net								
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						7.57	(36)
if details	of therma	al bridging	are not kr	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			43.32	(37)
Ventila	ation hea	at loss ca	alculated	monthly	/		,	,	(38)m	= 0.33 × (25)m x (5))		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	19.75	19.48	19.22	17.89	17.63	16.3	16.3	16.04	16.83	17.63	18.16	18.69		(38)
Heat tr	ransfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	63.07	62.8	62.54	61.21	60.95	59.62	59.62	59.35	60.15	60.95	61.48	62.01		
										Average =	Sum(39)1	12 /12=	61.14	(39)

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.24	1.23	1.23	1.2	1.2	1.17	1.17	1.16	1.18	1.2	1.21	1.22		
Ľ	r of day		nth (Tab	l <u> </u>	<u> </u>				,	Average =	Sum(40)1	12 /12=	1.2	(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. Wat	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TFA	A > 13.9	upancy, I 9, N = 1 9, N = 1		:[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	FFA -13		72]	(42)
Reduce t	he annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.04]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	82.54	79.54	76.54	73.54	70.54	67.54	67.54	70.54	73.54	76.54	79.54	82.54		_
Energy c	ontent 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		900.48	(44)
(45)m=	122.41	107.06	110.48	96.32	92.42	79.75	73.9	84.8	85.81	100.01	109.17	118.55		_
lf instanta	aneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		<mark>Γota</mark> l = Su	m(45) ₁₁₂ =		1180.67	(45)
(46)m=	18.36	16.06	16.57	14.45	13.86	11.96	11.08	12.72	12.87	15	16.37	17.78		(46)
Water s	-		vincludir	ng any se	olar or M		storage	within sa	ame ves	ما		2	1	(47)
_				ink in dw						501		2		(47)
		•			•			ombi boil	ers) ente	er '0' in (47)			
Water s	-													
a) If ma	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
•			m Table									0		(49)
0,			•	, kWh/y∉				(48) x (49)) =			2		(50)
Hot wat	ter stor	age loss	factor fr	cylinder l com Tabl							0.	03]	(51)
	-	leating s from Ta	ee secti	on 4.3									1	(50)
			m Table	2h								91 .6		(52) (53)
				, kWh/ye	oor			(47) x (51)) v (52) v (53) -]	
•••		(54) in (5	-	, KVVII/yt	al			(47) × (51)) ^ (32) ^ (55) –		13 13		(54) (55)
		. , .		for each	month			((56)m = (55) × (41)ı	m		10	I	()
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07]	(56)
								i0), else (5] lix H	()
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
Primary	/ circuit	loss (ar	nual) fro	om Table	3							0		(58)
Primary	/ circuit	loss cal	culated	for each	month (• •	65 × (41)		r tharms -			I	. /
(mod (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	23.26	22.51	23.26		(59)
(00)11=	20.20	21.01	20.20	22.01	20.20	22.01	20.20	20.20	22.01	20.20	22.01	20.20	l	(00)

$(61)m=$ 00000000000Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$ $(62)m=$ 149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(61) (62) (63) (64)
(62)m=149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(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)
(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 0](64)
Output from water heater	(64)
(64)m= 149.74 131.74 137.8 122.76 119.75 106.2 101.23 112.13 112.26 127.34 135.61 145.88	(64)
Output from water heater (annual) 112 1502.43	
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= 62.56 55.34 58.6 53.18 52.59 47.67 46.43 50.06 49.69 55.11 57.45 61.28	(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= 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 13.36 11.86 9.65 7.3 5.46 4.61 4.98 6.47 8.69 11.03 12.88 13.73	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 149.83 151.39 147.47 139.13 128.6 118.7 112.09 110.54 114.45 122.8 133.32 143.22	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 31.6 31.6 31.6 31.6 31.6 31.6 31.6 31.6	(69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	
$ (71)m = \begin{array}{c c c c c c c c c c c c c c c c c c c $	(71)
Water heating gains (Table 5)	
(72)m= 84.09 82.36 78.76 73.86 70.69 66.21 62.41 67.28 69.01 74.08 79.8 82.36	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$	(/
(73)m= 296.07 294.4 284.67 269.09 253.54 238.32 228.28 233.09 240.95 256.7 274.79 288.11	(73)
6. Solar gains:	()
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.	
Orientation: Access Factor Area Flux g_ FF Gains	
Table 6dm²Table 6aTable 6bTable 6c(W)	
Southeast 0.9x 0.77 x 7.91 x 36.79 x 0.5 x 0.85 = 85.72	(77)
Southeast 0.9x 0.77 x 7.91 x 62.67 x 0.5 x 0.85 = 146.01](77)
Southeast 0.9x 0.77 x 7.91 x 85.75 x 0.5 x 0.85 = 199.78](77)
Southeast 0.9x 0.77 x 7.91 x 106.25 x 0.5 x 0.85 = 247.53](77)
Southeast 0.9x 0.77 x 7.91 x 119.01 x 0.5 x 0.85 = 277.26	(77)

														_
Southeast 0.9x	0.77	x	7.9	91	x	1	18.15	x	0.5	x	0.85	=	275.25	(77)
Southeast 0.9x	0.77	x	7.9	91	x	1	13.91	x	0.5	x	0.85	=	265.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	1	04.39	x	0.5	x	0.85	=	243.2	(77)
Southeast 0.9x	0.77	x	7.9	91	x	g	2.85	x	0.5	x	0.85	=	216.32	(77)
Southeast 0.9x	0.77	x	7.9	91	x	6	9.27	x	0.5	x	0.85	=	161.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	4	4.07	x	0.5	x	0.85	=	102.67	(77)
Southeast 0.9x	0.77	x	7.9	91	x	3	1.49	x	0.5	x	0.85	=	73.36	(77)
Southwest _{0.9x}	0.77	x	4.2	25	x	3	6.79		0.5	x	0.85	=	46.06	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	3	6.79]	0.5	x	0.85	=	48.33	(79)
Southwest0.9x	0.77	x	4.2	25	x	6	2.67		0.5	x	0.85	=	78.45	(79)
Southwest0.9x	0.77	x	4.4	16	x	6	2.67	1	0.5	x	0.85	=	82.33	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	8	5.75	1	0.5	x	0.85	=	107.34	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	8	5.75	1	0.5	x	0.85	=	112.64	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	1	06.25	1	0.5	x	0.85	=	133	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	1	06.25	1	0.5	x	0.85	=	139.57	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	1	19.01	1	0.5	x	0.85	=	148.97	(79)
Southwest _{0.9x}	0.77	x	4.4	ł6	x	1	19.01	Ì	0.5	x	0.85	=	156.33	(79)
Southwest0.9x	0.77	x	4.2	25	×	1	18.15		0.5	х	0.85	=	147.89	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.4	46	x	1	18.15	İ.	0.5	x	0.85	-	155.2	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	x	1	13.91		0.5	x	0.85	=	142.58	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	×	1	13.91	i/	0.5	x	0.85	=	149.63	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	x	1	04.39	Í	0.5	x	0.85	-	130.67	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	x	1	04.39	1	0.5	x	0.85	=	137.13	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.2	25	x	g	2.85	1	0.5	x	0.85	=	116.23	(79)
Southwest _{0.9x}	0.77	×	4.4	46	x	g	2.85	1	0.5	×	0.85	=	121.97	(79)
Southwest _{0.9x}	0.77	×	4.2	25	x	6	9.27	İ	0.5	x	0.85	=	86.7	(79)
Southwest _{0.9x}	0.77	x	4.4	ł6	x	6	9.27	İ	0.5	x	0.85	=	90.99	(79)
Southwest _{0.9x}	0.77	x	4.2	25	×	4	4.07	İ	0.5	x	0.85	=	55.16	(79)
Southwest _{0.9x}	0.77	x	4.4	ł6	x	4	4.07		0.5	x	0.85	=	57.89	(79)
Southwest0.9x	0.77	x	4.2	25	x	3	1.49	İ	0.5	x	0.85	=	39.41	(79)
Southwest _{0.9x}	0.77	×	4.4	ł6	x	3	1.49	İ	0.5	x	0.85	=	41.36	(79)
Solar gains in	watts, ca	lculated	d for eac	h montł	า			(83)m	= Sum(74)m	(82)m		_	_	
(83)m= 180.11	306.79	419.76	520.1	582.56		78.35	557.59	510	.99 454.51	339.0	7 215.73	154.13		(83)
Total gains –	internal a	nd sola	r (84)m =	= (73)m	+ (8	33)m	, watts							
<mark>(84)m=</mark> 476.18	601.19	704.43	789.19	836.1	8′	16.66	785.86	744	.08 695.46	595.7	7 490.52	442.24		(84)
7. Mean inte	rnal temp	erature	(heating	seaso	n)									
Temperature	during h	eating p	periods ir	n the liv	ing	area	from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fa	ctor for ga	ains for	living are	ea, h1,r	n (se	ee Ta	ble 9a)	-						
Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.96	0.91	0.8	0.64	(0.46	0.33	0.3	0.58	0.85	0.97	0.99		(86)
Mean interna	al tempera	ature in	living ar	ea T1 (1	ollo	w ste	ps 3 to 7	7 in T	able 9c)					
Mean interna (87)m= 19.94	al tempera 20.22	ature in 20.52	living are 20.8	ea T1 (1 20.94	-	w ste :0.99	ps 3 to 7 21	7 in T	1	20.77	20.31	19.9]	(87)

Temp	erature	during h	neating p	periods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	19.89	19.89	19.9	19.92	19.92	19.94	19.94	19.95	19.94	19.92	19.92	19.91		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	ee Table	9a)			-	-		
(89)m=	0.98	0.95	0.89	0.76	0.58	0.39	0.25	0.28	0.5	0.81	0.96	0.99		(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=	18.52	18.92	19.34	19.72	19.88	19.94	19.94	19.95	19.92	19.69	19.07	18.48		(90)
				•					f	LA = Livin	g area ÷ (4	4) =	0.61	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwe	llina) = f	A x T1	+ (1 – fl	A) x T2					
(92)m=	19.39	19.71	20.06	20.38	20.53	20.58	20.59	20.59	20.56	20.35	19.82	19.34		(92)
Apply	adjustn	nent to t	he mear	n internal	l temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.39	19.71	20.06	20.38	20.53	20.58	20.59	20.59	20.56	20.35	19.82	19.34		(93)
8. Sp	ace hea	ting req	uirement	t			•	•	•					
						ed at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut		r	<u> </u>	using Ta			<u>г.</u>			<u> </u>				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.98	0.95	ains, hm 0.89	0.78	0.61	0.43	0.3	0.33	0.54	0.83	0.96	0.99		(94)
				4)m x (84		0.43	0.5	0.55	0.54	0.03	0.30	0.93		(04)
(95)m=	467.09	572.18	629.57	613.78	513.73	353.16	237.16	247.77	378.56	49 <u>3.68</u>	470.07	435.89		(95)
				perature										
(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 me	an interr	al tempe	erature,	Lm,W:	=[(39)m	x [(93)m	– (96)m]				
(97)m=	951.42	929.88	847.81	702.52	537.89	356.47	237.6	248.47	388.64	59 <mark>4.17</mark>	782.14	938.91		(97)
Space	e heatin	g 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=	360.34	240.38	162.37	63.89	17.97	0	0	0	0	74.77	224.69	374.25		
								Tota	al per year	(kWh/yeai	r) = Sum(9	8)15,912 =	1518.6	6 <mark>(98)</mark>
Space	e heatin	g requir	ement in	ı kWh/m²	/year								29.78	(99)
9b. En	ergy rec	quiremer	nts – Coi	mmunity	heating	scheme)							
		•		ating, spa		-		• •	•		unity scł	neme.		
Fractio	n of spa	ace heat	from se	condary	/supplen	nentary	heating	(Table 1	1) '0' if n	one			0	(301)
Fractio	n of spa	ace heat	from co	mmunity	v system	1 – (30	1) =						1	(302)
The com	nmunity so	cheme ma	y obtain he	eat from se	everal sour	rces. The j	orocedure	allows for	CHP and u	up to four	other heat	sources; ti	he latter	
			-	maland wa		rom powe	r stations.	See Appe	ndix C.					(202-)
				ity boiler									1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and	charging	g method	(Table 4	4c(3)) fo	or commu	unity hea	ating sys ⁻	tem			1	(305)
Distrib	ution los	s factor	(Table 2	12c) for c	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	g											kWh/y	/ear
Annua	space	heating	requiren	nent									1518.6	6
Space	heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	1594.5	9 (307a)
Efficier	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308

Space heating requirement from secondary/supplementary sys	stem (98) x (301) x 1	00 ÷ (308) =	0	(309)
]
Water heating Annual water heating requirement			1502.43	1
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	1577.56	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	e) + (310a)(310e)] =	31.72	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	n outside		115.24	(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) =	115.24	(331)
Energy for lighting (calculated in Appendix L)			235.9	(332)
12b. CO2 Emissions – Community heating scheme				
CO2 from other sources of space and water heating (not CHP)	Energy kWh/year	Emission factor kg CO2/kWh (366) for the second fue	kg CO2/year	(367a)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP using the source 1 (%) If there is CHP using the source of the	kWh/year	kg CO2/kWh	kg CO2/year](367a)](367)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP using the source 1 (%) If there is CHP using the source of the	kWh/year	kg CO2/kWh (366) for the second fue	kg CO2/year	_
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b)	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367)
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367) (372)
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 2) =	kg CO2/year	(367) (372) (373)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 2) =	kg CO2/year	(367) (372) (373) (374)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantar	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x neous heater (312) x (373) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 2) =	kg CO2/year	(367) (372) (373) (374) (375)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantar Total CO2 associated with space and water heating	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x neous heater (312) x (373) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 2) = 0 = 0.22 =	kg CO2/year](367)](372)](373)](374)](375)](376)
CO2 from other sources of space and water heating (not CHP Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantar Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dwe	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x neous heater (312) x (373) + (374) + (375) = lling (331)) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 0 = 0.22 = 0 = 0.22 =	kg CO2/year](367)](372)](373)](374)](375)](376)](378)
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP usi CO2 associated with heat source 1 [(307b) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantar Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dwe CO2 associated with electricity for lighting	kWh/year ng two fuels repeat (363) to +(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x neous heater (312) x (373) + (374) + (375) = lling (331)) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 0 = 0.22 = 0 = 0.22 =	kg CO2/year](367)](372)](373)](374)](375)](376)](378)](379)

		U	Jser De	etails:						
Assessor Name: Software Name:	Stroma FSAP 2012	_	S	Softwa	a Num ire Ver	sion:		Versio	n: 1.0.4.14	
		Prop	perty A	ddress:	Flat 3-0)3				
Address :										
1. Overall dwelling dimer	isions:			(a)						
Ground floor		1	Area(· ·	(10) ×	Av. Hei			Volume(m ³	_
	· · / 4 ! · · / 4 · · · / 4 · ! · · / 4 · !				(1a) x	3.	.08	(2a) =	221.4	(3a)
Total floor area TFA = (1a)+(1D)+(1C)+(1d)+(1e)	+(1n)	7	/2	(4)			(0)		_
Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	221.4	(5)
2. Ventilation rate:									<u> </u>	
		condary eating	0	other		total			m ³ 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 fan	s				- <u> </u>	0	x ′	10 =	0	(7a)
Number of passive vents					Γ	0	x ′	10 =	0	(7b)
Number of flueless gas fire	es				Γ	0	X 4	40 =	0	(7c)
					_			Air ch	anges per ho	ur
Infiltration due to chimney						0		÷ (5) =	0	(8)
If a pressurisation test has be		d, proceed to	o (17), oti	herwise c	ontinue fro	om (9) to (16)	I		
Number of storeys in the Additional infiltration	e dweiling (ris)						[(9)	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0.2	25 for steel or timber fr	ame or 0.3	35 for i	masonr	constr	uction	[(0)	1100.1 -	0	(11)
if both types of wall are pre	sent, use the value corresp							l	Ŭ	
deducting areas of opening If suspended wooden flo		a) or 0.1 (ontor O				_	
If no draught lobby, enter		u) 01 0. 1 ((Sealed	i), eise i					0	(12)
Percentage of windows		inned							0	(13)
Window infiltration		ippod	0	.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			3)	8) + (10) +	- (11) + (1	2) + (13) +	+ (15) =		0	(16)
Air permeability value, c	50, expressed in cubi	c metres p	oer hou	ır per so	uare m	etre of e	nvelope	area	4	(17)
If based on air permeabilit	y value, then (18) = [(17) ÷ 20]+(8), d	otherwise	e (18) = (*	16)				0.2	(18)
Air permeability value applies	if a pressurisation test has	been done o	or a degre	ee air per	meability i	is being us	sed			_
Number of sides sheltered			10	20) 4 [0 07E v (1	0)]			0	(19)
Shelter factor	and the line of the state				0.075 x (1	9)] =		l	1	(20)
Infiltration rate incorporation	-		(2	21) = (18)	x (20) =			l	0.2	(21)
Infiltration rate modified fo				A	0	0.1	NL.		l	
	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	<u> </u>		0.0	07	4	4.0	4.5	47		
(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		

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	-		_	
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24	ĺ	
		<i>ctive air</i> al ventila	0	rate for t	he appli	cable ca	se							(23a)
				endix N. (2	3b) = (23a	a) x Fmv (e	equation (N5)) , othei	wise (23b) = (23a)			0.5	
			• • •		, ,	, ,		n Table 4h		, (,			76.5	
			-	-	-			HR) (24a		2h)m + (23h) v [[,]	1 <u>- (23c</u>)) (200)
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35	÷ 100]	(24a)
								MV) (24b				0.00	i	· · · ·
(24b)m=	r			0	0			0	0	0	0	0	I	(24b)
								n from c		ů	ů	ů	i	· · · ·
,					•	•		c) = (22b		5 x (23b))			
(24c)m=	<u> </u>	0	0	0	0	0	0	0	0	0	0	0		(24c)
		ı ventilatio	n or wh	l ole hous	e positiv	l /e input :	ı ventilatio	n from l	oft				1	
,								0.5 + [(2		0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	x (25)	-		-		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
3 He	at losse	s and he	at loss i	oaramete	or:									
ELEN		Gros		Openin		Net Ar	ea	U-valu	le	AXU		k-value	<u>ــــــــــــــــــــــــــــــــــــ</u>	AXk
		area		m		A ,r		W/m2		(W/I	K)	kJ/m ² ·l		kJ/K
Doo <mark>rs</mark>						1.8	x	1.3	= [2.34				(26)
Windo	ws Type	e 1				5.27	x1.	/[1/(1.1)+	0.04] =	5.55				(27)
Windo	ws Type	e 2				1.52	x1.	/[1/(1.1)+	0.04] =	1.6	F			(27)
Windo	ws Type	e 3				9		/[1/(1.1)+	0.04] =	9.48	5			(27)
	ws Type					2.57	_ ,	/[1/(1.1)+	L	2.71	=			(27)
Walls		63.3	22	18.3	6	44.96		0.15		6.74				(29)
Walls									=		╡╏		\dashv	
		4.7		1.8		2.93		0.17	= [0.49				(29)
		elements				68.05		. fa	15/4/11	a) 0.041 a				(31)
				nternal wal			ated using	formula 1,	/[(1/U-vaiu	ie)+0.04] a	is given in	paragrapr	13.2	
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				28.9	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	8747	<u>.5 (34)</u>
Therm	al mass	parame	ter (TMI		- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	
For desi	ign asses:	sments wh	ere the de	tails of the	construct	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f	1]、 /
		ad of a de												
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						6.6	1 (36)
			are not kr	own (36) =	= 0.15 x (3	1)			(22)	(20)				(07)
	abric he		- - 4	l						(36) =	05)		35.5	3 (37)
ventila	r	1	r	monthl		1	11	Δ		= 0.33 × (r	1	1	
(20)~	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec 25.75	1	(38)
(38)m=	27.22	26.85	26.48	24.66	24.29	22.47	22.47	22.1	23.2	24.29	25.02	25.75	i	(00)
	r	coefficier	r							= (37) + (3	· ·		1	
(39)m=	62.74	62.38	62.01	60.19	59.82	57.99	57.99	57.63	58.72	59.82	60.55	61.28		
										Average =	oum(39)₁	12 / IZ=	60.0	9 (39)

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.87	0.87	0.86	0.84	0.83	0.81	0.81	0.8	0.82	0.83	0.84	0.85		
L			1					1	,	Average =	Sum(40)1	12 /12=	0.83	(40)
	Jan	Feb	nth (Tab 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)
(,	01	20			01					01		01		()
4. Wa	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF	A > 13.9	upancy, 9, N = 1 9, N = 1		:[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		29		(42)
Reduce	the annua	al average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve	+ 36 a water us	se target o		.68		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	97.54	94	90.45	86.9	83.35	79.81	79.81	83.35	86.9	90.45	94	97.54		
Energy c	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor		m(44) ₁₁₂ = ables 1b, 1		1064.1	(44)
(45)m=	144.65	126.51	130.55	113.82	109.21	94.24	87.33	100.21	101.41	118.18	129	140.09		_
lf instant	aneous w	ater heati	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1395.2	(45)
(46)m=	21.7	18.98	19.58	17.07	16.38	14.14	13.1	15.03	15.21	17.73	19.35	21.01		(46)
Water s		loss:												
-				-					a <mark>me ve</mark> s	sel		2		(47)
		•	and no ta		•			· ·		or (0' in ((17)			
Water s			not wate	er (unis ir	iciudes i	nstantar	leous co	ווסם ומחזכ	ers) ente	er U in (47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(48) x (49)) =			2		(50)
•			eclared o	•									1	
		-	factor fr		e 2 (kW	h/litre/da	ay)				0.	03		(51)
		from Ta		011 4.5							3	91		(52)
			m Table	2b								.6		(53)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	0.	13		(54)
•••		(54) in (5	-									13		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = ((55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	s 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	lix H	
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
Primary	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary	y circuit	loss cal	culated	for each	month (,	• •	65 × (41)					-	
, L	-	1	r	· · · · · ·	1	1	i	<u> </u>	a cylinde	1	, 	i	I	
(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 eac	h r	month (61)m =	(60	D) ÷ 36	65 × (41))m						_	
(61)m=	0	0	0		0	0		0	0	0	0		0	0	0		(61)
Total h	neat req	uired for	water l	hea	ating ca	alculated	d fo	or eacl	n month	(62)m	= 0.85	× (•	45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		(62)
Solar DI	HW input	calculated	using Ap	per	ndix G or	Appendi	ĸН	(negativ	ve quantity	/) (ente	'0' if no s	olar	contribut	ion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	Sa	nd/or V	VWHRS	S ap	oplies,	, see Ap	pendi	(G)						
(63)m=	0	0	0		0	0		0	0	0	0		0	0	0		(63)
Output	t from w	ater hea	ter														
(64)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		
		-								C	utput from	ו wa	ter heate	r (annual)₁	12	1716.97	(64)
Heat g	jains fro	m water	heating	g, k	(Wh/mo	onth 0.2	5 ′	[0.85	× (45)m	+ (61)m] + 0.	8 x	[(46)m	+ (57)m	+ (59)m]	
(65)m=	69.96	61.81	65.27	Τ	59	58.18	5	52.49	50.9	55.18	54.8	7	61.16	64.05	68.44		(65)
inclu	ude (57))m in calo	culation	l of	ⁱ (65)m	only if c	ylin	nder is	s in the c	dwellir	g or hot	t wa	ater is fi	rom com	munity h	leating	
5. In	ternal q	ains (see	e Table	5 a	and 5a)):	-				-				-	_	
	Ŭ	ns (Table			,												
wictab	Jan	Feb	Mar		, Apr	May	Γ	Jun	Jul	Au	g Se	р	Oct	Nov	Dec		
(66)m=	114.68	114.68	114.68		114.68	114.68	1	14.68	114.68	114.6			114.68	114.68	114.68		(66)
Lightin		(calcula		_		equal	tion	190	(19a) a								
(67)m=	18	15.99	13	T	9.84	7.36	-	6.21	6.71	8.73		- 1	14.87	17.36	18.5		(67)
	L	ains (calc		in									_		10.0	l i	
(68)m=	201.92	<u> </u>	198.73	_	187.49	173.3		59.97	151.06	148.9			165.48	179.67	193.01	1	(68)
· ·	L		<u> </u>	_			-						_	175.07	100.01		(00)
(69)m=	34.47	s (calcula 34.47	34.47	-	34.47	L, equa 34.47	-	34.47	34.47	, also 34.4			34.47	34.47	34.47	1	(69)
						54.47		04.47	34.47	54.4	54.4	1	34.47	34.47	34.47		(00)
-		ins gains	r`	58			-	-	-							1	(70)
(70)m=	0	0	0		0	0		0	0	0	0		0	0	0		(70)
	<u> </u>	vaporatic	<u> </u>	—		, ,	1	,						r		1	(
(71)m=	-91.75	-91.75	-91.75		-91.75	-91.75	-9	91.75	-91.75	-91.7	5 -91.7	'5	-91.75	-91.75	-91.75		(71)
Water		gains (T	able 5	_			_							,		1	
(72)m=	94.03	91.98	87.73		81.95	78.19	7	72.91	68.41	74.17	76.2	2	82.2	88.96	91.99		(72)
Total i	interna	l gains =	:				_	(66)	m + (67)m			+ (70)m + (7	'1)m + (72))m		
(73)m=	371.36	369.39	356.87		336.69	316.26	2	96.49	283.59	289.2	6 299.5	58	319.96	343.39	360.91		(73)
	lar gain																
		calculated	•	lar f		Table 6a	and		•	tions to	convert to	o the	e applicat		tion.		
Orient		Access F Table 6d			Area m²			Flu	x ole 6a		g_ Table 6	sh	т	FF able 6c		Gains (W)	
				-	111-			1 ai			Table	50	, , ,			(**)	-
	ast <mark>0.9x</mark>	0.77	:	×Ĺ	9		x	1	1.28	×	0.5		×	0.85	=	29.91	(75)
	ast <mark>0.9x</mark>	0.77		×	9		x	2	2.97	×	0.5		×	0.85	=	60.88	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	4	1.38	×	0.5		_ × [0.85	=	109.68	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	6	7.96	×	0.5		x	0.85	=	180.13	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	9	1.35	×	0.5		x	0.85	=	242.13	(75)

Northeast 0.9x	0.77) ×	9	×	97.38	x	0.5	x	0.85	=	258.14	(75)
Northeast 0.9x	0.77] x	9	x	91.1	x	0.5	x	0.85	=	241.48	(75)
Northeast 0.9x	0.77	x	9	x	72.63	x	0.5	x	0.85	=	192.51	(75)
Northeast 0.9x	0.77	」 】 ×	9	x	50.42	x	0.5	x	0.85	=	133.65](75)
Northeast 0.9x	0.77	l x	9	x	28.07	x	0.5	x	0.85	=	74.4](75)
Northeast 0.9x	0.77	x	9	x	14.2	x	0.5	x	0.85	=	37.63	(75)
Northeast 0.9x	0.77	x	9	x	9.21	x	0.5	x	0.85	=	24.42	(75)
Southwest _{0.9x}	0.77	x	5.27	x	36.79		0.5	x	0.85	=	57.11	(79)
Southwest _{0.9x}	0.77	x	5.27	x	62.67		0.5	x	0.85	=	97.28	(79)
Southwest0.9x	0.77	x	5.27	x	85.75		0.5	x	0.85	=	133.1	(79)
Southwest _{0.9x}	0.77	×	5.27	×	106.25		0.5	x	0.85	=	164.92	(79)
Southwest _{0.9x}	0.77	x	5.27	x	119.01		0.5	x	0.85	=	184.72	(79)
Southwest _{0.9x}	0.77	x	5.27	×	118.15		0.5	x	0.85	=	183.39	(79)
Southwest _{0.9x}	0.77	x	5.27	x	113.91		0.5	x	0.85	=	176.8	(79)
Southwest _{0.9x}	0.77	x	5.27	x	104.39		0.5	x	0.85	=	162.03	(79)
Southwest _{0.9x}	0.77	×	5.27	x	92.85		0.5	x	0.85	=	144.12	(79)
Southwest _{0.9x}	0.77	x	5.27	x	69.27		0.5	x	0.85	=	107.51	(79)
Southwest _{0.9x}	0.77	x	5.27	×	44.07		0.5	x	0.85	=	68.4	(79)
Southwest0.9x	0.77	x	5.27	х	31.49		0.5	x	0.85	=	48.87	(79)
Northwest 0.9x	0.77	x	1.52	x	11.28	×	0.5	x	0.85	=	5.05	(81)
Northwest 0.9x	0.77	×	2.57	x	11.28	x	0.5	x	0.85	=	8.54	(81)
Northwest 0.9x	0.77	x	1.52	×	22.97	х	0.5	x	0.85	=	10.28	(81)
Northwest 0.9x	0.77	×	2.57	x	22 <mark>.</mark> 97	X	0.5	x	0.85	=	17.38	(81)
Northwest 0.9x	0.77	×	1.52	×	41.38	x	0.5	x	0.85	=	18.52	(81)
Northwest 0.9x	0.77	×	2.57	×	41.38	x	0.5	x	0.85	=	31.32	(81)
Northwest 0.9x	0.77	x	1.52	×	67.96	x	0.5	x	0.85	=	30.42	(81)
Northwest 0.9x	0.77	×	2.57	x	67.96	x	0.5	x	0.85	=	51.44	(81)
Northwest 0.9x	0.77	x	1.52	x	91.35	x	0.5	X	0.85	=	40.89	(81)
Northwest 0.9x	0.77	x	2.57	×	91.35	x	0.5	x	0.85	=	69.14	(81)
Northwest 0.9x	0.77	x	1.52	X	97.38	x	0.5	x	0.85	=	43.6	(81)
Northwest 0.9x	0.77	x	2.57	X	97.38	x	0.5	x	0.85	=	73.71	(81)
Northwest 0.9x	0.77	x	1.52	×	91.1	x	0.5	x	0.85	=	40.78	(81)
Northwest 0.9x	0.77	×	2.57	X	91.1	X	0.5	x	0.85	=	68.96	(81)
Northwest 0.9x	0.77	X	1.52	X	72.63	X	0.5	x	0.85	=	32.51	(81)
Northwest 0.9x	0.77	X	2.57	X	72.63	X	0.5	X	0.85	=	54.97	(81)
Northwest 0.9x	0.77	×	1.52	X	50.42	X	0.5	x	0.85	=	22.57	(81)
Northwest 0.9x	0.77	×	2.57	×	50.42	X	0.5	x	0.85	=	38.16	(81)
Northwest 0.9x	0.77	×	1.52	×	28.07	X	0.5	X	0.85	=	12.57	(81)
Northwest 0.9x	0.77	X	2.57	×	28.07	X	0.5	X	0.85	=	21.24	(81)
Northwest 0.9x	0.77	X	1.52	×	14.2	X	0.5	x	0.85	=	6.36	(81)
Northwest 0.9x	0.77	×	2.57	×	14.2	x	0.5	x	0.85	=	10.75	(81)

Northwest $0.9x$ 0.77 x 2.57 x 9.21 x 0.5 x 0.85 = (6.97 (61)) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 100.61 185.82 202.63 242.03 58.89 558.84 528.03 442.03 338.51 215.72 123.14 84.4 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (64)m = 471.97 555.21 649.5 763.6 853.15 855.33 811.62 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, 11,m (see Table 9a) Utilisation factor for gains for living area 11 (follow steps 3 to 7 in Table 9c) (67)m 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (67) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (68)m 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (68) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (69)m 21 0.98 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.99 0.91 0.99 1 (69) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (60)m 1 0.98 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.99 0.91 0.99 1 (7A) (7A) 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92
Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 471.97 555.21 649.5 763.6 853.15 855.33 811.82 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m 20.21 20.32 20.24 20.23 20.22 20.21 (88) Wean internal temperature in living area of dwelling from Table 9. Th2 (°C) (89) (80) (80) (80)
(64)m= 471.97 555.21 64.9.5 763.6 853.15 855.33 811.62 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, h1,m (see Table 9a) Lan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (80)m= 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) (87)m= 20.21 20.37 20.62 20.89 21 21 21 20.99 1.0 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (89)m= 1 0.99 0.81 0.59 0.31 0.56 0.9 9 1 (99) (91)<
7. Mean internal temperature (heating season) 7. Mean internal temperature (uring 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) (86)m= 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.21 20.37 20.62 20.89 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (88) (89)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m 1 0.52 (91) 1 <
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 (80)me 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.21 (88) 1 0.99 0.95 0.81 0.59 0.31 0.56 0.9 0.9 1 (90) (Balminternal temperature in the rest of dwelling) = fLA × T1 + (1 - fLA) × T2 (90) (81) 0.52 (91) (92)
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 (80)me 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.21 (88) 1 0.99 0.95 0.81 0.59 0.31 0.56 0.9 0.9 1 (90) (Balminternal temperature in the rest of dwelling) = fLA × T1 + (1 - fLA) × T2 (90) (81) 0.52 (91) (92)
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) Mean internal temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (87) (88) 20.19 20.2 20.2 20.22 20.23 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89) 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 1 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90) 1 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92) FLA = Living area + (4) = 0.52 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m
(87)m= 20.21 20.37 20.62 20.89 21 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 1 1.12 (90) (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92) (93)me 19.69 19.89 20.19 20.51 20.64 20.64<
(87)m= 20.21 20.37 20.62 20.89 21 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (91) (92) 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) Mean internal temperature from Table 4e, where appropriate (92) </td
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.21 (88) Utilisation factor for gains for rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (10.4 + 10.4) + (1 - fLA) + (1 -
(88)m= 20.19 20.2 20.2 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m= 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.22 20.44 20.03 19.54 19.12 (90) (90)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.64 20.42 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) 8 Space heating requirement (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, hm
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) (93)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (93) 8 Set Ti to the mean internal tempera
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) fLA = Living area \div (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (93) 8. Space heating requirement (93)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (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 Living area \div (Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation fac
(90)m= 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) fLA = Living area ÷ (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (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) Useful gains, hmGm, W = (94)m x (84)m (94)
fLA = Living area \div (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) (93) 8. Space heating requirement (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) Useful gains, hmGm , W = (94)m x (84)m (94) (94) (94)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$ (92) (92)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) (93) (93) (93) (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 (93) (94) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94)
(92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Image: the table of the table of the table of t
(92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Image: start is the start is
(93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m
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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (94)m x (84)m
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculatethe utilisation factor for gains using Table 9aJanFebMarAprMayJunJulAugSepOctNovDecUtilisation factor for gains, hm: $(94)m=$ 0.990.980.950.830.610.410.290.330.590.910.991(94)Useful gains, hmGm , W = (94)m x (84)m
the utilisation factor for gains using Table 9a $\begin{array}{c c c c c c c c c c c c c c c c c c c $
JanFebMarAprMayJunJulAugSepOctNovDecUtilisation factor for gains, hm: $(94)m=$ 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1(94)Useful gains, hmGm , W = (94)m x (84)m
Utilisation factor for gains, hm: $(94)m=$ 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Useful gains, hmGm , W = (94)m x (84)m
(30) = 1409.52 1 340.70 1 017.4 1 050.37 1 325.74 1 349.01 1 254.15 1 244.24 1 377.90 1 404.9 1 439.00 1 445.40 1 (30)
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 , $W = [(39)m \times [(93)m - (96)m]$
(97) m = 965.48 935.27 849.15 698.58 533.1 350.11 234.17 244.33 383.17 588.79 782.65 948.48
Space heating requirement for each month, kWh/month = $0.024 \times [(97)m - (95)m] \times (41)m$
(98)m= 369.14 261.07 172.42 48.97 6.96 0 0 0 0 77.29 232.39 375.72
Total per year (kWh/year) = Sum(98) _{15,912} = 1543.96 (98)
Total per year $(kWh/year) = Sum(98)_{15,912} = 1543.96$ (98)Space heating requirement in kWh/m²/year21.44 (99)

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 he	ating (Table '	1) '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 pro- includes boilers, heat pumps, geothermal and waste heat from power s	ocedure allows fo	•	our other heat sour	rces; the		_
Fraction of heat from Community boilers					1	(303a)
Fraction of total space heat from Community boilers			(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for a	community he	ating system			1	(305)
Distribution loss factor (Table 12c) for community heating	system				1.05	(306)
Space heating Annual space heating requirement				Γ	kWh/year 1543.96]
Space heat from Community boilers		(98) x (304a) x ((305) x (306) =		1621.16	(307a)
Efficiency of secondary/supplementary heating system in	% (from Tab	e 4a or Append	dix E)		0	(308
Space heating requirement from secondary/supplementa	ry system	(98) x (301) x 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement				Γ	1716.97]
If DHW from community scheme: Wat <mark>er heat from Community boilers</mark>		(64) x (303a) x ((305) x (306) =		1802.82	(310a)
Electricity used for heat distribution	0.0	1 × [(307a)(307e	e) + <mark>(310a)(310e</mark>	e)] =	34.24	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling system, if not en	ter 0)	= (107) ÷ (314) =	=		0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input	it from outside	9		Γ	204.2	(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) =		204.2	(331)
Energy for lighting (calculated in Appendix L)					317.91	(332)
12b. CO2 Emissions – Community heating scheme						-
		ergy /h/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heating (not Efficiency of heat source 1 (%) If there is C		ls repeat (363) to ((366) for the secor	nd fuel	92	(367a)
CO2 associated with heat source 1	(307b)+(310b)] x	100 ÷ (367b) x	0.22	=	803.89	(367)
Electrical energy for heat distribution	[(313) x		0.52	=	17.77	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	=	821.66	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or inst	antaneous he	ater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		-	821.66	(376)
CO2 associated with electricity for pumps and fans within	dwelling (33	1)) x	0.52	=	105.98	(378)

CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	164.99	(379)
Total CO2, kg/year	sum of (376)(382) =				1092.64	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.18	(384)
El rating (section 14)					87.49	(385)
						-



				User D	etails:						
Assessor Name: Software Name:	Stroma FS	AP 2012			Strom Softwa	are Ver	sion:		Versio	n: 1.0.4.14	
			Pi	roperty <i>i</i>	Address	Flat 4-0	6 Duple	X			
Address : 1. Overall dwelling dime	ncione										
	15015.			Δrea	a(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor						(1a) x		.85	(2a) =	219.45	(3a)
First floor						(1b) x		.75	(2b) =	154](3b)
	-) · (4 h) · (4 e) · ·	(1	(1 -				2.	.75	(20) -	154	
Total floor area TFA = (1	a)+(1D)+(1C)+	(10)+(1e)+	(1n)	133	(4)					-
Dwelling volume						(3a)+(3b)	+(3c)+(3d)+(3e)+	.(3n) =	373.45	(5)
2. Ventilation rate:			-								
	main heating	seco heat		У	other		total			m ³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 4	40 =	0	(6a)
Number of open flues	0	+	0	<u> </u> + [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns					- Г	0	x 1	10 =	0	(7a)
Number of passive vents							0	x 1	10 =	0	(7b)
Number of flueless gas fi	res						0	x 4	40 =	0	(7c)
						L			Air ch	anges per hou	J
Infiltration due to chimne	7						0		÷ (5) =	0	(8)
If a pressurisation test has b			roceed	d to (17), c	otherwise o	continue fro	om (9) to (16)			
Number of storeys in the Additional infiltration	ie dw <mark>eiling</mark> (na	5)						[(9)-	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0	.25 for steel o	timber fran	ne or	0.35 for	masonr	v constr	uction	[(3)-	11×0.1 =	0	(11)
if both types of wall are pl									I]()
deducting areas of openir If suspended wooden f			or 0	1 (00010	d) alaa	ontor O			I		
If no draught lobby, en		· · ·	010.	r (seale	a), eise	enter 0				0	(12) (13)
Percentage of windows			ed							0	(14)
Window infiltration		aagin ompp	- Cu		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, expresse	ed in cubic n	netre	s per ho	our per so	quare m	etre of e	nvelope	area	4	(17)
If based on air permeabil	ity value, then	(18) = [(17) ÷	20]+(8	8), otherwi	se (18) = (16)				0.2	(18)
Air permeability value applie		on test has bee	en don	e or a deg	gree air pe	rmeability	is being us	sed			-
Number of sides sheltere Shelter factor	d				(20) = 1 -	[0 075 x (1	9)] —			0	(19)
Infiltration rate incorporat	ing shelter fac	tor			(20) = (18)		0/] –			1	(20)
Infiltration rate modified for	-				() (10	, (==) =				0.2	(21)
Jan Feb	Mar Apr		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp				0.01							
(22)m= 5.1 5	4.9 4.4		8.8	3.8	3.7	4	4.3	4.5	4.7		

Wind F	actor (2	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		
Adjust	ed infiltr	ation rat	te (allow	ing for sł	nelter an	d wind s	speed) =	: (21a) x	(22a)m	-		-		
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24		
			-	rate for t	he appli	cable ca	ise			•		•	·	
		al ventila		andix NL (C	12h) (00a		aquation (I	NE)) othe	mulaa (02k	v) (00a)			0.5	(23a)
				endix N, (2)) = (23a)			0.5	(23b)
			-	ciency in %	_							4 (00)	76.5	(23c)
,	0.37	0.37	anical ve	0.34	0.33	at recove	0.31	HR) (24a	a)m = (2 0.32	1	23b) × [0.34	1 – (23c) 0.35	÷100]	(24a)
(24a)m=								I		0.33	I	0.35		(24a)
	r	r	1	entilation	· · · · ·	· · · · · ·	1	1	Í	T T	1		l	(24b)
(24b)m=		0	0	0	0	0	0	0	0	0	0	0		(24b)
,				ntilation of the the the the the the the the the the	•	•				5 x (23)	2)			
(24c)m=	r í	0.53	0		b) = (23L)			c) = (22)			0	0		(24c)
· · ·										Ŭ		0		(= ,
				nole hous)m = (221						0.5]				
(24d) <mark>m=</mark>	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - e	nter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)			•		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
2 40	atlassa	e and b		paramet	or:									
ELEN		Gro		Openin		Net Ar	.ea	U-val	lie	AXU		k-value	<u></u>	AXk
			(m²)	r	-	A ,r		W/m2		(W/		kJ/m²·ł		kJ/K
Doo <mark>rs</mark>						1.8	x	1.3	=	2.34				(26)
Windo	ws Type	e 1				7.33	x1	/[1/(1.1)+	- 0.04] =	7.72				(27)
Windo	ws Type	e 2				3.24	x1	/[1/(1.1)+	- 0.04] =	3.41				(27)
Windo	ws Type	e 3				9.26	x1	/[1/(1.1)+	- 0.04] =	9.76				(27)
Windo	ws Type	e 4				9.26	x1	/[1/(1.1)+	- 0.04] =	9.76				(27)
Windo	ws Type	e 5				6.14	-	/[1/(1.1)+	- 0.04] =	6.47				(27)
Rooflig	ghts					2.42		/[1/(1.1) +	0.04] =	2.662				(27b)
Walls	Type1	57.	3	10.5	7	46.73	3 X	0.15	=	7.01				(29)
Walls -	Type2	4.3	3	1.8		2.5	×	0.17		0.42			\dashv	(29)
Walls -		63.2		24.6	6	38.59	→ ×	0.15		5.79	i F		\dashv	(29)
Roof	pof 64 2.42					61.58		0.12		7.39			\dashv	(30)
Total a	area of e	elements		L		188.8		L		L	[(31)
				effective wi	indow U-va	L		g formula 1	1/[(1/U-vali	ue)+0.04] a	as given in	paragraph	3.2	. ,

** include the areas on both sides of internal walls and partitions

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	62.61	(33)
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	12309.22	(34)
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m ² K	Indicative Value: Medium	250	(35)
For design assessments where the details of the construction are not known i	precisely the indicative values of TMP in Table 1f		-

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be ι	used inste	ad of a dei	tailed calc	ulation.										
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						12.97	(36)
			are not kn	own (36) =	= 0.15 x (3	1)								_
Total fa	abric he	at loss							(33) +	(36) =			75.59	(37)
Ventila	tion hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	45.91	45.29	44.67	41.59	40.98	37.9	37.9	37.28	39.13	40.98	42.21	43.44		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	121.5	120.88	120.26	117.18	116.57	113.49	113.49	112.87	114.72	116.57	117.8	119.03		
										-	Sum(39)1.	12 /12=	117.03	(39)
	· · · · · ·	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	· (4)		1	
(40)m= 0.91 0.91 0.9 0.88 0.88 0.85 0.85 0.85 0.86 0.88 0.89 0.89 Average = Sum(40) ₁₁₂ /12=													_	
Numbe	er of day	/s in moi	nth (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 energy requirement: kWh/year:														
A													1	(
														(42)
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														
								(25 x N)				3.13		(43)
				usage by : [.] day (all w		-	7	to achieve	a water us	se target o	f			
												Du		
Hot wate	Jan er usage i	Feb	Mar day for ea	Apr ach month	May Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
	-		105.19	101.07			92.82	96.94	101.07	105.19	109.32	113.44		
(44)m=	113.44	109.32	105.19	101.07	96.94	92.82	92.62	96.94	101.07				1237.58	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D) Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		1237.56	(44)
(45)m=	168.23	147.14	151.83	132.37	127.02	109.6	101.56	116.55	117.94	137.45	150.03	162.93		
									-	Total = Su	m(45) ₁₁₂ =		1622.66	(45)
lf instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)	-			_	
(46)m=	25.24	22.07	22.78	19.86	19.05	16.44	15.23	17.48	17.69	20.62	22.5	24.44		(46)
	storage		الم ماريما							aal			1	
-		. ,					-	within sa	ame ves	sei		2		(47)
	•	-		nk in dw	-			(47) mbi boil	ore) onto	or '()' in (47)			
	storage		not wate		iciuues i	instantai								
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b			• /					0		(49)
-				, kWh/ye	ear			(48) x (49)	=			2		(50)
			-	ylinder l		or is not							l	()
		-		om Tabl	e 2 (kW	h/litre/da	ay)				0.	03		(51)
	•	eating s		on 4.3									1	
		from Tal		Эh								91		(52)
rempe	erature f	actor fro		ZD							0	.6		(53)

0.		om water (54) in (5	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		.13 .13		(54) (55)	
	. ,	loss cal		for each	month			((56)m = (55) × (41)ı	m	0.	.10		(00)	
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)	
			-					-		-		m Append	l lix H	()	
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)	
Primar	v circuit	loss (ar	nual) fro	om Table	e 3							0		(58)	
	-	loss cal				59)m = ((58) ÷ 36	65 × (41)	m						
(mo	dified 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=	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) ÷ 30	65 × (41))m							
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)	
Total h	neat req	uired for	water h	eating ca	alculated	l for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)	m	
(62)m=	195.56	171.82	179.16	158.82	154.34	136.05	128.89	143.87	144.39	164.77	176.48	190.25		(62)	
Solar DI	HW input	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)			
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (<u>3)</u>						
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)	
Output	t from w	ater hea	ter												
(64)m=	195.56	171.82	179.16	158.82	154.34	136.05	128.89	143.87	144.39	164.77	176.48	190.25			
	Output from water heater (annual)112 1944.42 (
Hea <mark>t g</mark>	l <mark>ain</mark> s fro	m water	heating.	, kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(<mark>46)m</mark> (+ (57)m	+ (<mark>59)m</mark>]		
(65)m=	77.8	68.67	72.35	65.17	64.09	57.6	55.63	60.61	60.37	67.56	71.04	7 <mark>6.04</mark>		(65)	
inclu	ude (57)	m in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	eating		
5. Int	ternal ga	ains (see	e Table S	5 and 5a):										
Metab	<u>olic gair</u>	ns (Table	<u>e 5), Wat</u>	ts			-								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(66)m=	145.12	145.12	145.12	145.12	145.12	145.12	145.12	145.12	145.12	145.12	145.12	145.12		(66)	
Lightin	ig gains	(calcula	ted in A	opendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5		-	_			
(67)m=	26.86	23.86	19.4	14.69	10.98	9.27	10.02	13.02	17.48	22.19	25.9	27.61		(67)	
Applia	nces ga	ins (calc	ulated in	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	-				
(68)m=	301.3	304.43	296.55	279.78	258.6	238.7	225.41	222.28	230.16	246.93	268.11	288.01		(68)	
Cookir	ng gains	(calcula	ated in A	ppendix	L, equa	tion L15	or L15a)), also se	e Table	5					
(69)m=	37.51	37.51	37.51	37.51	37.51	37.51	37.51	37.51	37.51	37.51	37.51	37.51		(69)	
Pumps	s and fa	ns gains	(Table :	5a)											
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0		(70)	
Losses	s e.g. e\	vaporatic	on (nega	tive valu	es) (Tab	ole 5)									
(71)m=	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09	-116.09		(71)	
Water	heating	gains (T	able 5)												
(72)m=	104.57	102.19	97.24	90.52	86.15	80	74.77	81.47	83.85	90.81	98.67	102.2		(72)	
Total i	internal	gains =				(66)	m + (67)m	n + (68)m +	+ (69)m + ((70)m + (7	1)m + (72))m	-		
(73)m=	499.27	497.01	479.73	451.52	422.27	394.51	376.74	383.31	398.02	426.47	459.21	484.35		(73)	
6. So	lar gain:	s:											-		

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	3.24	x	11.28	x	0.5	x	0.85	=	10.77	(75)
Northeast 0.9x	0.77	x	9.26	x	11.28	x	0.5	x	0.85	=	30.77	(75)
Northeast 0.9x	0.77	x	3.24	x	22.97	x	0.5	x	0.85	=	21.92	(75)
Northeast 0.9x	0.77	x	9.26	x	22.97	x	0.5	x	0.85	=	62.64	(75)
Northeast 0.9x	0.77	x	3.24	x	41.38	x	0.5	x	0.85	=	39.49	(75)
Northeast 0.9x	0.77	x	9.26	x	41.38	x	0.5	x	0.85	=	112.85	(75)
Northeast 0.9x	0.77	x	3.24	x	67.96	x	0.5	x	0.85	=	64.85	(75)
Northeast 0.9x	0.77	x	9.26	x	67.96	x	0.5	x	0.85	=	185.34	(75)
Northeast 0.9x	0.77	x	3.24	x	91.35	x	0.5	x	0.85	=	87.17	(75)
Northeast 0.9x	0.77	x	9.26	x	91.35	x	0.5	x	0.85	=	249.13	(75)
Northeast 0.9x	0.77	x	3.24	x	97.38	x	0.5	x	0.85	=	92.93	(75)
Northeast 0.9x	0.77	x	9.26	x	97.38	x	0.5	x	0.85	=	265.6	(75)
Northeast 0.9x	0.77	x	3.24	x	91.1	x	0.5	x	0.85	=	86.93	(75)
Northeast 0.9x	0.77	x	9.26	x	91.1	x	0.5	x	0.85	=	248.46	(75)
Northeast 0.9x	0.77	x	3.24	x	72.63	x	0.5	x	0.85	=	69.31	(75)
Northeast 0.9x	0.77	x	9.26	×	72.63	х	0.5	х	0.85	=	198.08	(75)
Northeast 0.9x	0.77	x	3.24	x	50.42	x	0.5	x	0.85	=	48.11	(75)
Northeast 0.9x	0.77	x	9.26	х	50.42	×	0.5	x	0.85	=	137.51	(75)
Northeast 0.9x	0.7 <mark>7</mark>	x	3.24	x	28.07	x	0.5	x	0.85	=	26.78	(75)
Northeast 0.9x	0.77	x	9.26	x	28.07	х	0.5	x	0.85	=	76.55	(75)
Northeast 0.9x	0.77	x	3.24	x	14.2	x	0.5	x	0.85	=	13.55	(75)
Northeast 0.9x	0.77	x	9.26	x	14.2	x	0.5	x	0.85	=	38.72	(75)
Northeast 0.9x	0.77	x	3.24	x	9.21	x	0.5	x	0.85	=	8.79	(75)
Northeast 0.9x	0.77	x	9.26	x	9.21	x	0.5	x	0.85	=	25.13	(75)
Southeast 0.9x	0.77	x	7.33	x	36.79	x	0.5	x	0.85	=	79.43	(77)
Southeast 0.9x	0.77	x	9.26	x	36.79	x	0.5	x	0.85	=	100.35	(77)
Southeast 0.9x	0.77	x	7.33	x	62.67	x	0.5	x	0.85	=	135.3	(77)
Southeast 0.9x	0.77	x	9.26	x	62.67	x	0.5	x	0.85	=	170.93	(77)
Southeast 0.9x	0.77	x	7.33	x	85.75	x	0.5	x	0.85	=	185.13	(77)
Southeast 0.9x	0.77	x	9.26	x	85.75	x	0.5	x	0.85	=	233.87	(77)
Southeast 0.9x	0.77	x	7.33	x	106.25	x	0.5	x	0.85	=	229.38	(77)
Southeast 0.9x	0.77	x	9.26	x	106.25	x	0.5	x	0.85	=	289.78	(77)
Southeast 0.9x	0.77	x	7.33	x	119.01	x	0.5	x	0.85	=	256.93	(77)
Southeast 0.9x	0.77	x	9.26	x	119.01	x	0.5	x	0.85	=	324.58	(77)
Southeast 0.9x	0.77	x	7.33	x	118.15	x	0.5	x	0.85	=	255.07	(77)
Southeast 0.9x	0.77	x	9.26	x	118.15	x	0.5	x	0.85	=	322.23	(77)
Southeast 0.9x	0.77	x	7.33	x	113.91	x	0.5	x	0.85	=	245.92	(77)
Southeast 0.9x	_	x	9.26	x	113.91	x	0.5	x	0.85	=	310.66	(77)
Southeast 0.9x	0.77	x	7.33	x	104.39	x	0.5	x	0.85	=	225.37	(77)

Southeast 0.9x	0.77	x	9.26	x	104.39	x	0.5	×	0.85	=	284.7	(77)	
Southeast 0.9x	0.77	×	7.33	x	92.85	x	0.5	x	0.85	=	200.46	(77)	
Southeast 0.9x	0.77	x	9.26	x	92.85	x	0.5	x	0.85	=	253.24	(77)	
Southeast 0.9x	0.77	x	7.33	x	69.27	x	0.5	×	0.85	=	149.54	(77)	
Southeast 0.9x	0.77	x	9.26	x	69.27	x	0.5	x	0.85	=	188.91	(77)	
Southeast 0.9x	0.77	x	7.33	x	44.07	x	0.5	x	0.85	=	95.14	(77)	
Southeast 0.9x	0.77	×	9.26	x	44.07	x	0.5	x	0.85	=	120.19	(77)	
Southeast 0.9x	0.77	×	7.33	x	31.49	x	0.5	x	0.85	=	67.98	(77)	
Southeast 0.9x	0.77	x	9.26	x	31.49	x	0.5	x	0.85	=	85.88	(77)	
Northwest 0.9x	0.77	x	6.14	x	11.28	x	0.5	×	0.85	=	20.4	(81)	
Northwest 0.9x	0.77	x	6.14	x	22.97	x	0.5	x	0.85	=	41.53	(81)	
Northwest 0.9x	0.77	×	6.14	x	41.38	x	0.5	x	0.85	=	74.83	(81)	
Northwest 0.9x	0.77	×	6.14	x	67.96	x	0.5	x	0.85	=	122.89	(81)	
Northwest 0.9x	0.77	x	6.14	x	91.35	x	0.5	x	0.85	=	165.19	(81)	
Northwest 0.9x	0.77	×	6.14	x	97.38	x	0.5	x	0.85	=	176.11	(81)	
Northwest 0.9x	0.77	×	6.14	x	91.1	x	0.5	x	0.85	=	164.75	(81)	
Northwest 0.9x	0.77	×	6.14	x	72.63	x	0.5	×	0.85	=	131.34	(81)	
Northwest 0.9x	0.77	x	6.14	×	50.42	x	0.5	х	0.85	=	91.18	(81)	
Northwest 0.9x	0.77	×	6.14	x	28.07	x	0.5	x	0.85	- 1	50.76	(81)	
Northwest 0.9x	0.77	x	6.14	x	14.2	x	0.5	x	0.85	=	25.67	(81)	
Northwest 0.9x	0.77	x	6.14	x	9.21	x	0.5	x	0.85	=	16.66	(81)	
Rooflights 0.9x	1	×	2.42	x	26	x	0.5	x	0.8	=	22.65	(82)	
Rooflights 0.9x	1	x	2.42	x	54	x	0.5	x	0.8	=	47.04	(82)	
Rooflights 0.9x	1	x	2.42	x	96	x	0.5	x	0.8	=	83.64	(82)	
Rooflights 0.9x	1	×	2.42	x	150	x	0.5	×	0.8	=	130.68	(82)	
Rooflights 0.9x	1	x	2.42	x	192	x	0.5	×	0.8	=	167.27	(82)	
Rooflights 0.9x	1	x	2.42	x	200	x	0.5	×	0.8	=	174.24	(82)	
Rooflights 0.9x	1	x	2.42	x	189	x	0.5	×	0.8	=	164.66	(82)	
Rooflights 0.9x	1	×	2.42	x	157	x	0.5	×	0.8	=	136.78	(82)	
Rooflights 0.9x	1	×	2.42	x	115	x	0.5	×	0.8	= =	100.19	(82)	
Rooflights 0.9x	1	x	2.42	x	66	x	0.5	×	0.8	=	57.5	(82)	
Rooflights 0.9x	1	x	2.42	x	33	x	0.5	×	0.8	= =	28.75	(82)	
Rooflights 0.9x	1	×	2.42	x	21	x	0.5	×	0.8	= =	18.3	(82)	
												_	
Solar gains in v	Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$												
(83)m= 264.37													
Total gains – in								550.0	. 022.00		I	()	
			(0+)(1-)(1-)(1-)(1-)(1-)(1-)(1-)(1-)(1-)(1-										

7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C)

Utilisation factor for gains for living area, h1,m (see Table 9a)

1209.53 1474.43 1672.53 1680.69 1598.11 1428.87 1228.71

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

976.51

781.24

707.08

763.64

(84)m=

976.37

21

(84)

(85)

(86)m=	1	0.99	0.96	0.84	0.63	0.43	0.31	0.36	0.63	0.94	0.99	1		(86)
Mean	internal	temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	20.07	20.28	20.57	20.87	20.98	21	21	21	20.99	20.78	20.36	20.04		(87)
Temp	erature	during h	eating p	periods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	20.16	20.16	20.16	20.18	20.19	20.21	20.21	20.21	20.2	20.19	20.18	20.17		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	ee Table	9a)						
(89)m=	1	0.99	0.95	0.81	0.58	0.38	0.26	0.3	0.56	0.91	0.99	1		(89)
Mean	internal	temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to	7 in Tabl	e 9c)				
(90)m=	18.9	19.21	19.63	20.05	20.17	20.21	20.21	20.21	20.19	19.94	19.35	18.88		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.46	(91)
Mean	internal	l temper	ature (fo	or the wh	ole dwe	llina) = f	LA x T1	+ (1 – fL	.A) × T2			•		_
(92)m=	19.44	19.7	20.07	20.43	20.54	20.57	20.57	20.58	20.56	20.33	19.82	19.41		(92)
Apply	adjustr	nent to tl	he mear	n internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.44	19.7	20.07	20.43	20.54	20.57	20.57	20.58	20.56	20.33	19.82	19.41		(93)
			uirement											
				mperatur using Ta		ied at st	ep 11 of	Table 9	b, 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			ains, hm	<u> </u>	Ividy	Jun		<u> Aug</u>		001	NOV	Dee		
(94)m=	1	0.99	0.95	0.82	0.6	0.4	0.28	0.33	0.59	0.92	0.99	1		(94)
Us <mark>efu</mark>	<mark>I g</mark> ains,	hmGm ,	, W = (9	4)m x (84	4)m	r								
(95)m=	<mark>76</mark> 1.48	965.16	1152.71	1211.52	1011.49	676.57	450.81	471.01	728.81	89 <mark>6.61</mark>	774.69	705.78		(95)
Month	-			perature										
(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)
			r	al tempe		r	<u> </u>		r è <i>i</i>	Ē	4 407 05	4040.00		(07)
(97)m=			1631.74		1031	677.76	450.9	471.25	740.84	1134.01		1810.96		(97)
(98)m=	801.7		356.4	r each m 100.29	14.51		11 = 0.02	<u>4 x [(97</u>)m – (95 0)11] X (4	520.75	822.25		
(00)		00010				Ĵ	Ů		l per year				3346.42	(98)
Space	- hoatin	a roquir	omont in	⊨kWh/m²	lucar					()) call(c	c)1	25.16	(99)
					•								25.10	
				mmunity				ting prov	ided by		unity onk			
				ating, spa condary/							unity SCI		0	(301)
Fractio	n of spa	ice heat	from co	mmunity	system	1 – (30 ⁻	1) =					[1	(302)
The com	nmunity sc	heme ma	v obtain he	eat from se	everal sou	rces. The J	procedure	allows for	CHP and i	up to four o	other heat	L sources; th	ne latter	
includes	boilers, h	eat pumps	s, geotheri	mal and wa	aste heat f					,		,		_
Fractio	n of hea	at from C	Commun	ity boiler	S								1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys [.]	tem		[1	(305)
Distrib	ution los	s factor	(Table 1	12c) for c	commun	ity heatii	ng syste	m]	1.05	(306)
Space	heating	9										•	kWh/year	
Annua	l space l	heating	requiren	nent									3346.42	

Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	3513.74	(307a)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or Appen	dix E)	0	(308
Space heating requirement from secondary/supplementary syste	m (98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			1944.42	1
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	2041.64	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	e) + (310a)(310e)] =	55.55	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from c	utside		344.44	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330l	o) + (330g) =	344.44	(331)
Energy for lighting (calculated in Appendix L)			474.38	(332)
12b. CO2 Emissions – Community heating scheme				
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using	Energy kWh/year		kg CO <mark>2/yea</mark> r	(367a)
CO2 associated with heat source 1 [(307b)+(3	10b)] x 100 ÷ (367b) x	0.22 =	1304.31	(367)
Electrical energy for heat distribution	313) x	0.52 =	28.83	(372)
Total CO2 associated with community systems (3	63)(366) + (368)(372	2) =	1333.14	(373)
CO2 associated with space heating (secondary) (3	09) x	0 =	0	(374)
CO2 associated with water from immersion heater or instantaned	ous heater (312) x	0.22 =	0	(375)
Total CO2 associated with space and water heating (3	73) + (374) + (375) =		1333.14	(376)
CO2 associated with electricity for pumps and fans within dwellin	g (331)) x	0.52 =	178.76	(378)
CO2 associated with electricity for lighting (3	32))) x	0.52 =	246.2	(379)
Total CO2, kg/year sum of (376)(382) =			1758.11	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			13.22	(384)
El rating (section 14)			86.76	(385)

		Use	er Details:										
Assessor Name: Software Name:	Stroma FSAP 2012		Strom Softwa	are Ver	sion:		Versio	n: 1.0.4.14					
		Prope	rty Address:	: Flat 4-0)2								
Address :													
1. Overall dwelling dimen	SIONS:				A 11a!	arls ((ma)) / a luma a /m 2)					
Ground floor		<i>۲</i>	Area(m²)	(1a) x	Av. Hei		(2a) =	Volume(m ³)	(3a)				
	· (1b) · (1c) · (1d) · (1c)	. (1n) [2.	85	(2a) =	185.25	(34)				
Total floor area $TFA = (1a)$	+(10)+(10)+(10)+(10)+	+(11)	65	(4) (32) (35))+(3c)+(3d) . (20) .	(2n) =		⊐				
Dwelling volume				(3a) + (3b)) T(30)T(3 0)+(3e)+	.(31) =	185.25	(5)				
2. Ventilation rate:	mein		o th o r		totol			m3 nor hour					
		condary ating	other		total			m ³ per hour					
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 fans	3				0	x ′	10 =	0	(7a)				
Number of passive vents					0	x '	10 =	0	(7b)				
Number of flueless gas fire	s			Γ	0	X 4	40 =	0	(7c)				
Number of flueless gas fires 0 x 40 = 0 Air changes per here													
Infiltration due to chimneys					0		÷ (5) =	0	(8)				
If a pressurisation test has been		, proceed to (1	7), otherwise c	continue fr	om (9) to (16)							
Number of storeys in the Additional infiltration	dweiling (ns)					[(9)]	-1]x0.1 =	0	(9) (10)				
Structural infiltration: 0.2	5 for steel or timber fr	ame or 0.35	for masonr	v constr	uction	[(3)	1,0.1 -	0	(10) (11)				
if both types of wall are pres	sent, use the value correspo			•	uouon		I	0]()				
deducting areas of opening If suspended wooden flo		d) or 0 1 (or	alad) alaa	ontor O				_					
If no draught lobby, ente		u) or 0.1 (Se	ealed), eise	enter U				0	(12)				
Percentage of windows		nned						0	(13) (14)				
Window infiltration	and doors draught still	ppeu	0.25 - [0.2	x (14) ÷ 1	00] =			0	(14)				
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) +	- (15) =		0	(16)				
Air permeability value, q	50, expressed in cubic	c metres pe	r hour per so	quare m	etre of e	nvelope	area	4	(17)				
If based on air permeability		•	•	•		•		0.2	(18)				
Air permeability value applies	if a pressurisation test has l	been done or a	degree air pei	rmeability	is being us	sed	I						
Number of sides sheltered								0	(19)				
Shelter factor			(20) = 1 -		9)] =			1	(20)				
Infiltration rate incorporation	-		(21) = (18)) x (20) =				0.2	(21)				
Infiltration rate modified for							_	1					
	1ar Apr May	Jun Ju	ıl Aug	Sep	Oct	Nov	Dec						
Monthly average wind spec	<u> </u>							l					
(22)m= 5.1 5 4	9 4.4 4.3	3.8 3.8	3 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 0.9	5 0.92	1	1.08	1.12	1.18						

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_		
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24			
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se						-		
				ondix N (2	(22) = (22)	$) \times Emv(c)$	oquation (N	NE)) othou	rwise (23b) = (22a)				0.5	(23a)
) = (23a)				0.5	(23b)
			-	-	-			n Table 4h						6.5	(23c)
		i		i	i	i	<u> </u>	<u> </u>	í .	, <u>,</u>	<u> </u>	1 – (23c)) ÷ 100] I		$(0, 1, \cdot)$
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(24a)
	r	· · · · · ·		· · · · · ·	· · · · · ·	· · · · · ·	<u> </u>	ИV) (24b	o)m = (22	, ,	<u>,</u>	1	1		
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
,					•	•		on from c c) = (22t	outside o) m + 0.	5 × (23b))				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
,								on from l 0.5 + [(2	oft 2b)m² x	0.5]			•		
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0]		(24d)
Effe	ctive air	change	rate - er	nter (24a)) or (24b) or (24	c) or (24	d) in boy	(25)				1		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(25)
	. I lances											_	1		
				oaramet								la combra			V L
ELEN	IENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value	_	A . kJ	X k /K
Doors						1.8	x	1.3	=	2.34					(26)
Windo	ws Type	e 1				10.53	3 x1.	/[1/(1.1)+	0.04] =	11.09					(27)
Windo	ws Type	92				8.51	x1.	/[1/(1.1)+	0.04] =	8.97					(27)
Walls ⁻	Type1	47.	9	19.0	4	28.86	3 X	0.15		4.33	ור				(29)
Walls ⁻	Type2	5.3	3	1.8		3.5	x	0.17		0.58					(29)
Roof		65	;	0		65	x	0.12		7.8	= i				(30)
Total a	area of e	lements	. m²			118.2			เ		I				(31)
* for win	ndows and	roof wind	ows, use e	effective wi nternal wal		alue calcul		formula 1	/[(1/U-valu	e)+0.04] a	as given in	paragraph	n 3.2		
			= S (A x		io ana pan			(26)(30)) + (32) =				3	5.12	(33)
		Cm = S(-,					((28)	.(30) + (32	2) + (32a)	(32e) =		313.4	(34)
			. ,	⁻ = Cm ÷	- TFA) ir	n k.I/m²K				tive Value		(/		250	(35)
For des	ign assess	sments wh		tails of the				ecisely the	e indicative			able 1f		.50	
				culated	usina Ac	pendix l	K						c	.28	(36)
	-		,	own (36) =	• •	•								.20	
	abric he				,	,			(33) +	(36) =			4	4.39	(37)
Ventila	ation hea	at loss ca	alculated	d monthly	у				(38)m	= 0.33 × (25)m x (5)	<u> </u>		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]		
(38)m=	22.77	22.47	22.16	20.63	20.33	18.8	18.8	18.49	19.41	20.33	20.94	21.55	1		(38)
Heat ti	ransfer o	coefficie	nt, W/K	•	•	•			(39)m	= (37) + (3	38)m		•		
(39)m=	67.17	66.86	66.55	65.03	64.72	63.19	63.19	62.89	63.8	64.72	65.33	65.94			
	L		•							Average =	Sum(39)	12 /12=	6	4.95	(39)

Heat lo	ss para	meter (H	HLP), W	′m²K					(40)m	= (39)m ÷	÷ (4)			
(40)m=	1.03	1.03	1.02	1	1	0.97	0.97	0.97	0.98	1	1.01	1.01		
L	r of dou		I					1	,	Average =	Sum(40) 1.	₁₂ /12=	1	(40)
	Jan	Feb	nth (Tab 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)
	51	20						51	- 50			51		()
4. Wat	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF/				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		12]	(42)
Reduce t	the annua	al average		usage by	5% if the a	welling is	designed	(25 x N) to achieve	+ 36 a water us	se target o		.52]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
г			r day for ea			r	r						1	
(44)m=	92.98	89.6	86.21	82.83	79.45	76.07	76.07	79.45	82.83	86.21	89.6 Im(44) ₁₁₂ =	92.98	1014.29	(44)
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x L	OTm / 3600			ables 1b, 1		1014.29	(44)
(45)m=	137.88	120.59	124.44	108.49	104.1	89.83	83.24	95.52	96.66	112.65	122.96	133.53		
lf instanta	aneous w	ater heati	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =		1329.9	(45)
(46)m=	<mark>2</mark> 0.68	18.09	18.67	16. <mark>27</mark>	15.61	13.47	12.49	14.33	14.5	16.9	18.44	20.03		(46)
Water a	-							····						
				-					ame ves	sei		2		(47)
	•	-	and no ta hot wate		-			. ,	ers) ente	er '0' in ((47)			
Water s	-			· .		<i></i>	<i>.</i>						1	
			eclared I		or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
0,			r storage eclared o			or is not		(48) x (49)) =			2		(50)
Hot wat	ter stora	age loss	factor fr	om Tab							0.	03		(51)
	•	from Ta	ee secti ble 2a	011 4.3							2	91	1	(52)
			m Table	2b								.6		(52)
			⁻ storage		ear			(47) x (51) x (52) x (53) =		13]	(54)
		(54) in (5	-	, .,					, , , , ,			13		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = ((55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	s 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	lix H	
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07]	(57)
Primary	/ circuit	loss (ar	nnual) fro	om Table	e 3							0]	(58)
							. ,	65 × (41)		. ().				
Г		-	r	1	i	i		<u> </u>	a cylinde	i	<u> </u>	00.00	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 each month (61)m = (60) ÷ 365 × (41)m															
(61)m=	0	0	0	0	0		0	0	0	0	0	0	0]	(61)
Total h	eat req	uired for	water I	neating	calculated	d fo	r eacl	n month	(62)m =	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	165.21	145.28	151.77	134.94	131.43	1	16.28	110.57	122.85	123.11	139.98	149.41	160.86]	(62)
Solar DH	IW input	calculated	using Ap	pendix G	or Appendi	(H)	(negati	ve quantity	v) (enter 'C	' if no sola	r contribu	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	S and/or	WWHR	S ap	plies	, see Ap	pendix (G)				_	
(63)m=	0	0	0	0	0		0	0	0	0	0	0	0		(63)
Output	from w	ater hea	ter												
(64)m=	165.21	145.28	151.77	134.94	131.43	1	16.28	110.57	122.85	123.11	139.98	149.41	160.86]	
		-			-				Out	out from w	ater heate	er (annual)	12	1651.66	(64)
Heat g	ains fro	m water	heating	g, kWh/r	nonth 0.2	5 ´	[0.85	× (45)m	+ (61)n	n] + 0.8 x	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	67.71	59.84	63.24	57.23	56.48	5	51.03	49.54	53.62	53.3	59.32	62.04	66.26		(65)
inclu	de (57)	m in calo	culation	of (65)	n only if o	ylir	nder i	s in the c	dwelling	or hot w	ater is f	rom com	munity h	- neating	
5. Int	ernal g	ains (see	e Table	5 and 5	a):										
Metabo	olic gair	ns (Table	e 5). Wa	atts											
	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	105.95	105.95	105.95	105.95	105.95	1	05.95	105.95	105.95	105.95	10 <mark>5.95</mark>	105.95	105.95		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion	L9 o	r L9a), a	lso see	Table 5					
(67)m=	16.52	14.68	11.94	9.04	6.75	Γ	5.7	6.16	8.01	10.75	13.65	15.93	16.98		(67)
Appliar	$\frac{16.52}{14.68} = 11.94 = 9.04 = 6.75 = 5.7 = 6.16 = 8.01 = 10.75 = 13.65 = 15.93 = 16.98 = 10.77 = 10.75 = 13.65 = 15.93 = 16.98 = 10.77 = 10.75 = 13.65 = 15.93 = 16.98 = 10.77 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = 10.75 = 13.65 = 15.93 = 16.98 = 10.75 = $														
(68)m=	-	187.28	182.44		-	<u> </u>	46.85	138.67	136.75	141.59	151.91	164.94	177.18	1	(68)
Cookin	a gains	s (calcula	ted in /	Appendi	x L, equa	tior	ו L15	or L15a)	, also s	ee Table	e 5			1	
(69)m=	33.59	33.59	33.59	33.59	33.59	-	33.59	33.59	33.59	33.59	33.59	33.59	33.59	1	(69)
Pumps	and fa	ns gains	(Table	5a)									I		
(70)m=	0	0	0	0	0	Γ	0	0	0	0	0	0	0]	(70)
		I /aporatio	n (nea	I ative val	ues) (Tal	ble	5)							1	
(71)m=		r	<u> </u>	-		1	84.76	-84.76	-84.76	-84.76	-84.76	-84.76	-84.76	1	(71)
		ı gains (T				I								1	
(72)m=	91.01	89.05	85	79.49	75.91	7	0.87	66.59	72.07	74.02	79.73	86.17	89.06	1	(72)
		l gains =				I	(66)					 71)m + (72)		1	. ,
(73)m=	347.67	345.8	334.15	315.42	296.54	2	278.2	266.2	271.61	281.15	300.07	321.82	338.01	1	(73)
	ar gain			1	1							1			· ,
			using sol	ar flux fro	m Table 6a	and	associ	ated equa	tions to co	onvert to th	ne applica	ble orientat	tion.		
Orienta	ation:	Access F	actor	Are	а		Flu	х		g_		FF		Gains	
		Table 6d		m²	2		Tal	ole 6a	Т	able 6b	٦	able 6c		(W)	
Southea	ast <mark>0.9x</mark>	0.77	;	<u>د</u> ا	.51	x	3	6.79	x	0.5	×	0.85	=	92.22	(77)
Southea	ast <mark>0.9x</mark>	0.77	;	<u>د</u>	.51	x	6	2.67	x	0.5	= _	0.85	=	157.09	(77)
Southea	ast <mark>0.9x</mark>	0.77	;		.51	x		5.75	x	0.5	× [0.85	=	214.93	(77)
Southea	ast <mark>0.9x</mark>	0.77	;		.51	x	1	06.25	x	0.5		0.85	=	266.31	(77)
Southea	ast <mark>0.9x</mark>	0.77		× د	.51	x	1	19.01	x	0.5		0.85	=	298.29	(77)

Southeast 0.9x	0.77	x	8.51	x	1	18.15	x	0.5	x	0.85	:	= [296.13	(77)
Southeast 0.9x	0.77	x	8.51	x	1	113.91		0.5	x	0.85		- [285.5	(77)
Southeast 0.9x	0.77	x	8.51	x	1	104.39		0.5	x	0.85	:	= [261.64	(77)
Southeast 0.9x	0.77	x	8.51	x	g	92.85		0.5	x	0.85		= [232.72	(77)
Southeast 0.9x	0.77	x	8.51	x	69.27		x	0.5	x	0.85	:	- [173.61	(77)
Southeast 0.9x	0.77	x	8.51	x	44.07		x	0.5	x	0.85	:	- [110.46	(77)
Southeast 0.9x	0.77	x	8.51	×	3	31.49		0.5	x	0.85		- [78.92	(77)
Southwest0.9x	0.77	x	10.53	×	3	36.79	İ	0.5	x	0.85		- [114.11	(79)
Southwest0.9x	0.77	x	10.53	x	6	62.67	1	0.5	x	0.85	;	- [194.37	(79)
Southwest0.9x	0.77	x	10.53	x	8	35.75	İ	0.5	×	0.85		= [265.95	(79)
Southwest0.9x	0.77	×	10.53	×	1	106.25		0.5	×	0.85		- Ī	329.52	(79)
Southwest0.9x	0.77	×	10.53	×	1	19.01	İ	0.5	×	0.85		- Ī	369.09	(79)
Southwest0.9x	0.77	×	10.53	×	1	18.15	i i	0.5	×	0.85		- Ī	366.42	(79)
Southwest0.9x	0.77	×	10.53	× ا	1	13.91	1	0.5	×	0.85	 ,	- ľ	353.27	(79)
Southwest0.9x	0.77	×	10.53	×	1	104.39		0.5	×	0.85		= ľ	323.75	(79)
Southwest0.9x	0.77	×	10.53	_ ×		92.85	i i	0.5	×	0.85	;	= ľ	287.97	(79)
Southwest0.9x	0.77	×	10.53	× آ	6	69.27		0.5	×	0.85		- ľ	214.82	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	10.53	×	4	44.07		0.5	x	0.85		- 1	136.68	(79)
Southwest0.9x	0.77	×	10.53	≓ ×		31.49	i i	0.5	x	0.85		- 1	97.65	(79)
		اممدمان	for ook m	o in the			(02)-	C	(00)					
Solar gains in			í		662 56		r í	= Sum(74)m .	<u> </u>	247 14	176.5	8		(83)
(83)m= 206.3	3 351.4 <mark>6 4</mark>	80.88	595.83 66	7.38	662.56 (83)m	638.78	(<mark>83)m</mark> 585		(<mark>82)m</mark> 388.44	247.14	176.5	8		(83)
	3 351.4 <mark>6 4</mark> internal and	80.88	595.83 66 (84)m = (7	3)m +		638.78	r í	.4 520.69	<u> </u>		176.5 514.5			(83) (84)
(83)m= 206.33 Total gains – (84)m= 554	3 351.46 4 internal and 697.25 8	80.88 solar	595.83 66 (84)m = (7 911.26 96	3)m +	(83)m	638.78 , watts	585	.4 520.69	388.4		I			. ,
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte	3 351.46 4 internal and 697.25 8 ernal temper	80.88 solar 15.03 cature (595.83 66 (84)m = (7 911.26 96 heating se	i7.38 3)m + i3.92 ason)	(83)m 940.76	638.78 , watts 904.98	585 857	.01 801.84	388.4		I		21	(84)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte Temperatur	3 351.46 4 internal and 697.25 8 ernal temper e during hea	80.88 solar 15.03 rature (ating pe	595.83 66 (84)m = (7 911.26 96 heating seriods in the	7.38 3)m + 3.92 ason) e living	(83)m 940.76 g area	638.78 , watts 904.98 from Tab	585 857	.01 801.84	388.4		I		21	. ,
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte Temperatur	3 351.46 4 internal and 697.25 8 ernal temper	80.88 solar 15.03 rature (ating pe	595.83 66 (84)m = (7 911.26 96 heating se seriods in the eriods in the ying area, 1	7.38 3)m + 3.92 ason) e living	(83)m 940.76 g area	638.78 , watts 904.98 from Tab	585 857 ble 9,	.01 801.84	388.4	568.96	I	.9 [21	(84)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte Temperatur Utilisation fa	3 351.46 4 internal and 697.25 8 ernal temper e during hea actor for gain Feb	80.88 solar 15.03 ature (ating pe	595.83 66 (84)m = (7 91 911.26 96 heating se 96 eriods in the 96 ving area, Apr	7.38 3)m + 3.92 ason) e living h1,m ((83)m 940.76 g area see Ta	638.78 , watts 904.98 from Tab	585 857 ble 9,	.4 520.69 .01 801.84 Th1 (°C) ug Sep	388.44 688.5	568.96	514.5	.9 [c	21	(84)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte Temperatur Utilisation fa (86)m= 0.99	3351.464internal and697.25697.258ernal tempere during heaactor for gairFeb0.97	80.88 solar 115.03 ature (ating pe ns for li Mar 0.91	595.83 66 (84)m = (7 91 911.26 96 heating seriods in the ving area, 96 Apr 1 0.78 0	7.38 3)m + 3.92 ason) e living h1,m (May	(83)m 940.76 9 area see Ta Jun 0.43	638.78 , watts 904.98 from Tab ble 9a) Jul 0.31	585 857 ble 9, Au 0.3	5.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54	388.44 688.5	568.96 Nov	514.5	.9 [c	21	(84)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inte Temperatur Utilisation fa	3 351.46 4 internal and 697.25 8 ernal temper e during hea actor for gain Feb 0.97 al temperatu	80.88 solar 115.03 ature (ating pe ns for li Mar 0.91	595.83 66 (84)m = (7 91 911.26 96 heating sea 96 priods in the 96 ving area, 1 0.78 0 ving area 0	7.38 3)m + 3.92 ason) e living h1,m (May	(83)m 940.76 9 area see Ta Jun 0.43	638.78 , watts 904.98 from Tab ble 9a) Jul 0.31	585 857 ble 9, Au 0.3	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c)	388.44 688.5	 568.96 Nov 0.97 	514.5	.9 [[21	(84)
(83)m= 206.33 Total gains (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15	3 351.46 4 internal and 697.25 8 enal temper 8 actor for gain 7 Feb 0.97 al temperatu 20.4 2	80.88 solar 15.03 ature (ating pe as for li Mar 0.91 ure in li 20.67	595.83 66 (84) m = (7 96 911.26 96 heating set 96 priods in the 96 ving area, 96 0.78 0 ving area 0 20.89 20	7.38 3)m + 3.92 ason) e living h1,m (May .61 .61 .61 .098	(83)m 940.76 9 area 7 see Ta Jun 0.43 ow ste 21	638.78 , watts 904.98 from Tab able 9a) Jul 0.31 ps 3 to 7 21	585 857 ble 9, 0.3 7 in T 2 ⁻	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 Table 9c) 20.99	388.44 688.5 Oct 0.84	 568.96 Nov 0.97 	514.5 De 0.99	.9 [[21	(84) (85) (86)
(83)m= 206.33 Total gains (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 0.97 8 al temperatu 20.4 20.4 2 e during heat	80.88 solar 15.03 ature (ating pe as for li Mar 0.91 ure in li 20.67	595.83 66 (84)m = (7 96 911.26 96 heating se 96 eriods in the 96 ving area, 1 Apr 1 0.78 0 ving area 2 20.89 20 eriods in re 1	7.38 3)m + 3.92 ason) e living h1,m (May .61 .61 .61 .098	(83)m 940.76 9 area 7 see Ta Jun 0.43 ow ste 21	638.78 , watts 904.98 from Tab able 9a) Jul 0.31 ps 3 to 7 21	585 857 ble 9, 0.3 7 in T 2 ⁻	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 Table 9c) 20.99 .9, Th2 (°C)	388.44 688.5 Oct 0.84	 568.96 Nov 0.97 20.47 	514.5 De 0.99	2	21	(84) (85) (86)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 0.97 8 al temperatu 20.4 2 e during heat 20.06 2	80.88 solar solar ints.03 rature (ating person ns for li Mar 0.91 ure in li 20.67 ating person ating person 20.06	595.83 66 (84)m = (7 91 911.26 96 heating se 96 eriods in the 96 ving area, 1 Apr 1 0.78 0 ving area 20.89 20.89 20 eriods in re 20.08	7.38 3)m + 3.92 ason) e living h1,m (May .61 .61 .61 .0.98 st of d' 0.09	(83)m 940.76 9 area see Ta Jun 0.43 ow ste 21 welling 20.11	638.78 , watts / 904.98 from Tab ble 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11	585 857 0le 9, 0.3 7 in T 2 ⁻ able 9	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 .0, Th2 (°C)	388.44 688.5 0ct 0.84 20.86	 568.96 Nov 0.97 20.47 	514.5 Dec 0.99 20.12	2	21	(84) (85) (86) (87)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa	3 351.46 4 internal and 697.25 8 ernal temper 8 e during heat 6 actor for gain 7 al temperatu 20.4 2 e during heat 2 20.4 2 actor for gain 2 actor for gain 2 actor for gain 2 actor for gain 2 actor for gain 2 actor for gain 2	80.88 solar solar i15.03 rature (ating persisting persistent ms for line Mar 0.91 ure in line 20.67 ating persistent ating persistent	595.83 66 (84)m = (7 96 911.26 96 heating se 96 eriods in the 97 0.78 0 ving area 0 20.89 20 eriods in re 20.08 20.08 20 est of dwel 96	7.38 3)m + 3.92 ason) e living h1,m (May .61 T1 (foll 0.98 st of d 0.09 ling, h2	(83)m 940.76 9 area 7 see Ta Jun 0.43 0 w ste 21 welling 20.11 2,m (se	638.78 , watts 904.98 from Tab ble 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table	585 857 ole 9, 0.3 7 in T 2 ⁻ able 9 20. 9a)	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 Table 9c) 20.99 .0 Th2 (°C) 11 20.1	388.44 688.5 0 0.84 20.86 20.09	 568.96 Nov 0.97 20.47 20.08 	514.5 De 0.99 20.12 20.07	2 7	21	(84) (85) (86) (87) (88)
(83)m= 206.33 Total gains (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa (89)m= 0.99	3 351.46 4 internal and 697.25 8 ernal temper 6 8 e during heat 6 6 actor for gain Feb 6 0.97 0.97 6 6 al temperature 20.4 2 2 e during heat 20.06 2 2 actor for gain 0.96 2 2	80.88 solar solar ints.03 rature (ating persisting persistent ns for line Mar 0.91 ure in line 20.06 ns for re 0.89	595.83 66 (84)m = (7 91 911.26 96 heating services 96 brinds in the 97 0.78 0 ving area 9 20.89 20 eriods in re 20.08 20.08 20 eriods in re 20.08 20.74 0	7.38 3)m + 3.92 ason) e living h1,m (May .61 T1 (foll 0.98 st of d 0.09 ling, h2 .55	(83)m 940.76 9 area 7 see Ta Jun 0.43 0.43 0.43 21 welling 20.11 2,m (se 0.37	638.78 , watts 904.98 from Tab ble 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24	585 857 ole 9, 0.3 7 in T 2 ⁻ able 9 20. 9a) 0.2	.4 520.69 .01 801.84 Th1 (°C) ug Sep .4 0.54 able 9c) 20.99 .0 Th2 (°C) 11 20.1 .7 0.47	388.44 688.5 0 0.84 20.86 20.09 0.8	 568.96 Nov 0.97 20.47 	514.5 Dec 0.99 20.12	2 7	21	(84) (85) (86) (87)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa (89)m= 0.99 Mean intern	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 1 0.97 1 1 al temperatu 20.4 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 0.96 2 actor for gain 0.96 1	80.88 solar solar ints.03 rature (ating person as for li Mar 0.91 ure in li 20.67 ating person <t< td=""><td>595.8366$(84)m = (7)$911.2696heating selectioneriods in theving area,Apr10.780ving area20.8920eriods in re20.0820eriods in re20.0820eriods in re0.740he rest of dwell</td><td>7.38 3)m + 3.92 ason) e living h1,m (May .61 D.98 st of d' D.98 ling, h2 .55 dwelling</td><td>(83)m 940.76 9 area see Ta Jun 0.43 ow ste 21 welling 20.11 2,m (se 0.37 g T2 (fi</td><td>638.78 , watts / 904.98 from Table 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24 ollow ste</td><td>585 857 0le 9, 0.3 7 in T 2⁻ able 9 20. 9a) 0.2 eps 3</td><td>.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 .0, Th2 (°C) 11 .11 20.1 .7 0.47 to 7 in Tabl</td><td>388.44 688.5 0 Cct 0.84 20.86 20.09 0.8 e 9c)</td><td> 568.96 Nov 0.97 20.47 20.08 0.96 </td><td>514.5 Der 0.99 20.12 20.07</td><td>2 2</td><td>21</td><td>(84) (85) (86) (87) (88) (89)</td></t<>	595.8366 $(84)m = (7)$ 911.2696heating selectioneriods in theving area,Apr10.780ving area20.8920eriods in re20.0820eriods in re20.0820eriods in re0.740he rest of dwell	7.38 3)m + 3.92 ason) e living h1,m (May .61 D.98 st of d' D.98 ling, h2 .55 dwelling	(83)m 940.76 9 area see Ta Jun 0.43 ow ste 21 welling 20.11 2,m (se 0.37 g T2 (fi	638.78 , watts / 904.98 from Table 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24 ollow ste	585 857 0le 9, 0.3 7 in T 2 ⁻ able 9 20. 9a) 0.2 eps 3	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 .0, Th2 (°C) 11 .11 20.1 .7 0.47 to 7 in Tabl	388.44 688.5 0 Cct 0.84 20.86 20.09 0.8 e 9c)	 568.96 Nov 0.97 20.47 20.08 0.96 	514.5 Der 0.99 20.12 20.07	2 2	21	(84) (85) (86) (87) (88) (89)
(83)m= 206.33 Total gains (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa (89)m= 0.99	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 1 0.97 1 1 al temperatu 20.4 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 0.96 2 actor for gain 0.96 1	80.88 solar solar ints.03 rature (ating persisting persistent ns for line Mar 0.91 ure in line 20.06 ns for re 0.89	595.8366 $(84)m = (7)$ 911.2696heating selectioneriods in theving area,Apr10.780ving area20.8920eriods in re20.0820eriods in re20.0820eriods in re0.740he rest of dwell	7.38 3)m + 3.92 ason) e living h1,m (May .61 T1 (foll 0.98 st of d 0.09 ling, h2 .55	(83)m 940.76 9 area 7 see Ta Jun 0.43 0.43 0.43 21 welling 20.11 2,m (se 0.37	638.78 , watts 904.98 from Tab ble 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24	585 857 ole 9, 0.3 7 in T 2 ⁻ able 9 20. 9a) 0.2	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 0, Th2 (°C) 11 11 20.1 .7 0.47 to 7 in Tabl 11 20.09	388.44 688.5 0Ct 0.84 20.86 20.09 0.8 20.09 0.8 20.09	 568.96 568.96 Nov 0.97 20.47 20.08 0.96 19.43 	514.5 De 0.99 20.12 20.07 0.99	2 2		(84) (85) (86) (87) (88) (89) (90)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa (89)m= 0.99 Mean intern	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 1 0.97 1 1 al temperatu 20.4 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 1 2 actor for gain 0.96 2 actor for gain 0.96 1	80.88 solar solar ints.03 rature (ating person as for li Mar 0.91 ure in li 20.67 ating person <t< td=""><td>595.8366$(84)m = (7)$911.2696heating selectioneriods in theving area,Apr10.780ving area20.8920eriods in re20.0820eriods in re20.0820eriods in re0.740he rest of dwell</td><td>7.38 3)m + 3.92 ason) e living h1,m (May .61 D.98 st of d' D.98 ling, h2 .55 dwelling</td><td>(83)m 940.76 9 area see Ta Jun 0.43 ow ste 21 welling 20.11 2,m (se 0.37 g T2 (fi</td><td>638.78 , watts / 904.98 from Table 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24 ollow ste</td><td>585 857 0le 9, 0.3 7 in T 2⁻ able 9 20. 9a) 0.2 eps 3</td><td>.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 0, Th2 (°C) 11 11 20.1 .7 0.47 to 7 in Tabl 11 20.09</td><td>388.44 688.5 0Ct 0.84 20.86 20.09 0.8 20.09 0.8 20.09</td><td> 568.96 Nov 0.97 20.47 20.08 0.96 </td><td>514.5 De 0.99 20.12 20.07 0.99</td><td>2 2</td><td>21</td><td>(84) (85) (86) (87) (88) (89)</td></t<>	595.8366 $(84)m = (7)$ 911.2696heating selectioneriods in theving area,Apr10.780ving area20.8920eriods in re20.0820eriods in re20.0820eriods in re0.740he rest of dwell	7.38 3)m + 3.92 ason) e living h1,m (May .61 D.98 st of d' D.98 ling, h2 .55 dwelling	(83)m 940.76 9 area see Ta Jun 0.43 ow ste 21 welling 20.11 2,m (se 0.37 g T2 (fi	638.78 , watts / 904.98 from Table 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24 ollow ste	585 857 0le 9, 0.3 7 in T 2 ⁻ able 9 20. 9a) 0.2 eps 3	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 0, Th2 (°C) 11 11 20.1 .7 0.47 to 7 in Tabl 11 20.09	388.44 688.5 0Ct 0.84 20.86 20.09 0.8 20.09 0.8 20.09	 568.96 Nov 0.97 20.47 20.08 0.96 	514.5 De 0.99 20.12 20.07 0.99	2 2	21	(84) (85) (86) (87) (88) (89)
(83)m= 206.33 Total gains – (84)m= 554 7. Mean inter Utilisation fa (86)m= 0.99 Mean intern (87)m= 20.15 Temperatur (88)m= 20.06 Utilisation fa (89)m= 0.99 Mean intern	3 351.46 4 internal and 697.25 8 ernal temper 8 actor for gain Feb 0.97 8 al temperatu 20.4 2 actor for gain 2 al temperatu 2 actor for gain 2 al temperatu 1 19.31 1	80.88 solar solar ints.03 ating persisting persistent as for line Mar 0.91 ure in line 20.06 as for re 0.89 ure in ti 19.67	595.83 66 (84)m = (7 911.26 96 heating services 96 brinds in the 96 ving area, 96 Apr 1 0.78 0 ving area 20 20.89 20 eriods in re 20 20.08 20 est of dwell 0.74 0.74 0 he rest of c 19.97 20 20	7.38 3)m + 3.92 ason) e living h1,m (May .61 T1 (foll 0.98 st of d 0.09 ling, h2 .55 dwelling	(83)m 940.76 9 area 7 see Ta Jun 0.43 0.43 0.43 20.11 2,m (se 0.37 g T2 (fr 20.11	638.78 , watts 904.98 from Table 9a) Jul 0.31 ps 3 to 7 21 from Ta 20.11 ee Table 0.24 ollow ste 20.11	585 857 0le 9, 0.3 7 in T 2 ⁷ able 9 20. 9a) 0.2 9a) 0.2 9a) 0.2	.4 520.69 .01 801.84 Th1 (°C) Jg Sep .4 0.54 able 9c) 20.99 .0 Th2 (°C) 11 20.1 .7 0.47 to 7 in Tabl 20.09 .1 20.09	388.44 688.5 0Ct 0.84 20.86 20.09 0.8 20.09 0.8 20.09	 568.96 568.96 Nov 0.97 20.47 20.08 0.96 19.43 	514.5 De 0.99 20.12 20.07 0.99	2 2		(84) (85) (86) (87) (88) (89) (90)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.69	19.99	20.29	20.54	20.63	20.66	20.66	20.66	20.65	20.51	20.07	19.65		(93)
8. Sp	ace hea	ting requ	uirement	t										
				mperatui using Ta		ied at ste	ep 11 of	Table 9t	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	1:										
(94)m=	0.98	0.96	0.89	0.76	0.59	0.41	0.28	0.31	0.51	0.82	0.96	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m			-						
(95)m=	545.44	666.2	727.11	693.02	564.56	381.47	256.36	267.69	412.88	563.15	547.39	508.83		(95)
Month	nly aver	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		i	an intern	al tempe		Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1033.92	1008.68	917.66	756.68	577.86	382.75	256.49	267.91	417.76	641.39	847.56	1019.07		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	363.43	230.15	141.77	45.84	9.89	0	0	0	0	58.21	216.13	379.62		-
								Tota	l per year	(kWh/year	[.]) = Sum(9	8)15,912 =	1445.04	(98)
Space	e heatin	g require	ement in	kWh/m ²	/year								22.23	(99)
9b. En	erav rea	uiremer	nts – Cor	mmunity	heating	scheme								-
This pa	art is us	ed for sp	ace hea	ting, spa	ace cooli	ing or wa	ater heat	ting prov Table 1			unity sch	neme.	0	(301)
									1) 0 11 11	one]
Fractio	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-									up to four o	other heat	sources; ti	he latter	
			-	ity boiler		rom powei	r stations.	See Apper	ndix C.				1	(303a)
Fractio	on of tota	al space	heat fro	<mark>m Co</mark> mn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ting sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	a											kWh/year	-
-		-	requiren	nent									1445.04]
Space	heat fro	om Comr	munity b	oilers					(98) x (30	04a) x (30	5) x (306) =	=	1517.29	(307a)
Efficier	ncy of se	econdary	y/supple	mentary	heating	system	in % (frc	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
	heating I water h		equirem	ent									1651.66	1
			ty schen nunity bo						(64) x (30	03a) x (30	5) x (306) :	=	1734.24] (310a)
			at distribu					0.01			· (310a)…(32.52	(313)
	•			ncy Rati	0								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g system	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
				within dv ed, extra				outside					132.89	(330a)

warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b)	132.89	(331)	
Energy for lighting (calculated in Appendix L)			291.83	(332)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/ye	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using tw	vo fuels repeat (363) to (366) for the second fu	el 92	(367a)
CO2 associated with heat source 1 [(307b)+(31	0b)] x 100 ÷ (367b) x	0.22	= 763.4	4 (367)
Electrical energy for heat distribution [(3	13) x	0.52	= 16.88	3 (372)
Total CO2 associated with community systems (36	3)(366) + (368)(372)		= 780.2	8 (373)
CO2 associated with space heating (secondary) (30	99) x	0	= 0	(374)
CO2 associated with water from immersion heater or instantaneou	us heater (312) x	0.22	= 0	(375)
Total CO2 associated with space and water heating (37	'3) + (374) + (375) =		780.2	8 (376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x	0.52	= 68.97	7 (378)
CO2 associated with electricity for lighting (33	32))) x	0.52	= 151.4	6 (379)
Total CO2, kg/year sum of (376)(382) =			1000.7	71 (383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			15.4	(384)
El rating (section 14)			87.8′	1 (385)

Use	· Details:	
Assessor Name: Software Name: Stroma FSAP 2012		on: 1.0.4.14
	y Address: Flat 1-01	
Address :		
1. Overall dwelling dimensions:		
Ground floor	rea(m ²) Av. Height(m) 51 (1a) x 3.15 (2a) =	Volume(m ³)
		160.65 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$	51 (4) (3a)+(3b)+(3c)+(3d)+(3e)+(3n) =	
Dwelling volume	(3a) + (3b) + (3c) + (3a) + (3c) +	160.65 (5)
2. Ventilation rate:	othor total	m3 nor hour
main secondary heating heating	other total	m ³ per hour
Number of chimneys 0 + 0 +	0 = 0 × 40 =	0 (6a)
Number of open flues 0 + 0 +	0 = 0 x 20 =	0 (6b)
Number of intermittent fans	0 × 10 =	0 (7a)
Number of passive vents	0 × 10 =	0 (7b)
Number of flueless gas fires	0 × 40 =	0 (7c)
	Air c	hanges per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)$		0 (8)
If a pressurisation test has been carried out or is intended, proceed to (1)), otherwise continue from (9) to (16)	
Number of storeys in the dwelling (ns) Additional infiltration	[(9)-1]x0.1 =	0 (9) 0 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35		0 (11)
if both types of wall are present, use the value corresponding to the gr	•	
deducting areas of openings); if equal user 0.35	alad) alaa antar 0	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (se If no draught lobby, enter 0.05, else enter 0	aled), else enter o	0 (12)
Percentage of windows and doors draught stripped		0 (13) 0 (14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0 (14) 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	4 (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, other	rwise (18) = (16)	0.2 (18)
Air permeability value applies if a pressurisation test has been done or a	degree air permeability is being used	
Number of sides sheltered		0 (19)
Shelter factor	$(20) = 1 - [0.075 \times (19)] =$	1 (20)
Infiltration rate incorporating shelter factor	(21) = (18) × (20) =	0.2 (21)
Infiltration rate modified for monthly wind speed		7
Jan Feb Mar Apr May Jun Ju	Aug Sep Oct Nov Dec	
Monthly average wind speed from Table 7		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 = $(22)m \div 4$		
(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]

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_		
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24			
		ctive air	-	rate for t	he appli	cable ca	se	-		-	-				
		al ventila		ondix NL (2	(2b) = (22c)		oquation (I	N5)) , othe	nuico (22h) - (220)				.5	(23a)
		• •	0 11		, (, ,	• •	,, -	`) = (23a)				.5	(23b)
			-	-	_			n Table 4h		,				6.5	(23c)
		1		i	i	i	<u> </u>	<u> </u>	ŕ	, <u>,</u>	· · ·	1 – (23c)	÷ 100] I		(0.4.5)
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(24a)
		1		1	1	1		MV) (24b	ŕ	r í	, 	1	1		
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
,					•	•		on from c c) = (22b		5 × (23b)				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
,					•			on from l 0.5 + [(2		0.5]					
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b) or (24	c) or (24	d) in boy	k (25)				1		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(25)
0.115	et lesses								1			_		_	
		s and he				Net Ar		U-valı		AXU		kyolus		Δ,	Xk
ELEN		Gros area		Openin m		A,r		W/m2		A X U (W/I	<)	k-value kJ/m²·l		kJ/	
Doors						1.8	x	1.3	=	2.34					(26)
Windo	ws Type	e 1				7.91	x1	/[1/(1.1)+	0.04] =	8.33	F				(27)
	ws Type					4.25		/[1/(1.1)+	<u> </u>	4.48	Ħ				(27)
	ws Type					4.46	—	/[1/(1.1)+	L	4.7	H.				(27)
Walls				10.0				0.15	I						(29)
		52.5		16.6	2	36.28				5.44					
Walls		4.7		1.8		2.93		0.17	=	0.49					(29)
		elements				57.63			<i></i>						(31)
		l roof wind as on both					ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	is given in	n paragraph	1 3.2		
		ss, W/K :						(26)(30)) + (32) =				25	.78	(33)
		Cm = S(,					((28)	.(30) + (32	2) + (32a)	(32e) =		98.3	(34)
		parame	. ,	² = Cm ÷	- TFA) ir	n kJ/m²K				tive Value	· · ·			50.0	(35)
For des	ign asses:	•	ere the de	tails of the	,			recisely the	e indicative	values of	TMP in T	able 1f			
		es : S (L			using Ap	pendix I	K						7	57	(36)
	-	al bridging				-									
	abric he			()	·	,			(33) +	(36) =			33	.36	(37)
Ventila	ation hea	at loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)			_
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(38)m=	19.75	19.48	19.22	17.89	17.63	16.3	16.3	16.04	16.83	17.63	18.16	18.69			(38)
Heat ti	ransfer o	coefficie	nt, W/K	-	-	-	-	-	(39)m	= (37) + (3	- 38)m	-	•		
(39)m=	53.11	52.84	52.58	51.25	50.99	49.66	49.66	49.39	50.19	50.99	51.52	52.05			
	L	!						<u>.</u>	•	Average =	Sum(39)	₁₂ /12=	51	.18	(39)

Heat lo	ss para	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.04	1.04	1.03	1	1	0.97	0.97	0.97	0.98	1	1.01	1.02		
Numbe	r of day	s in mo	nth (Tab	le 1a)					,	Average =	Sum(40)1.	12 /12=	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)
L													1	
4. Wa	ter heat	ing enei	rgy requi	rement:								kWh/ye	ear:	
if TF/				[1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (⁻	TFA -13		72]	(42)
Reduce t	the annua	l average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.04]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage ir	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					-	
(44)m=	82.54	79.54	76.54	73.54	70.54	67.54	67.54	70.54	73.54	76.54	79.54	82.54		_
Ener <mark>gy c</mark>	content of	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		900.48	(44)
(45)m=	122.41	107.06	110.48	96. <mark>32</mark>	92.42	79.75	73.9	84.8	85.81	100.01	109.17	118.55		_
lf instant:	aneous w	ator hoatii	na at noint	of use (no	hot water	storage)	enter () in	boxes (46		Total = Su	m(45) ₁₁₂ =		1180.67	(45)
(46)m=	18.36	16.06	16.57	14.45	13.86	11.96	11.08	12.72	12.87	15	16.37	17.78	1	(46)
· · /	storage		10.37	14.43	13.00	11.90	11.00	12.12	12.07	15	10.37	17.70		(40)
Storage	e volum	e (litres)	includir	ig any so	olar or M	/WHRS	storage	within sa	a <mark>me ve</mark> s	sel		2		(47)
		•	ind no ta		•			. ,						
			hot wate	er (this ir	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
	storage anufact		eclared l	oss facto	or is kno	wn (kWł	n/dav):					0]	(48)
,			m Table				, , , .					0		(49)
•			· storage		ear			(48) x (49)) =			2		(50)
			eclared o	•									1	
		•	factor fr		e 2 (kW	h/litre/da	ıy)				0.	03		(51)
	•	from Ta		511 4.5							3.	91		(52)
			m Table	2b							0			(53)
Energy	lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	0.	13		(54)
Enter ((50) or (54) in (5	55)								0.	13		(55)
Water s	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	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=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
-			nual) fro									0		(58)
-						,	. ,	65 × (41)		* * +	atat)			
· r					1	1	1	ng and a		1	, 	22.26	1	(59)
(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	l	(53)

$(61)m=$ 00000000000Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$ $(62)m=$ 149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(61) (62) (63) (64)
(62)m=149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(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)
(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 0](64)
Output from water heater	(64)
(64)m= 149.74 131.74 137.8 122.76 119.75 106.2 101.23 112.13 112.26 127.34 135.61 145.88	(64)
Output from water heater (annual) 112 1502.43	
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= 62.56 55.34 58.6 53.18 52.59 47.67 46.43 50.06 49.69 55.11 57.45 61.28	(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= 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 13.36 11.86 9.65 7.3 5.46 4.61 4.98 6.47 8.69 11.03 12.88 13.73	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 149.83 151.39 147.47 139.13 128.6 118.7 112.09 110.54 114.45 122.8 133.32 143.22	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 31.6 31.6 31.6 31.6 31.6 31.6 31.6 31.6	(69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	
$ (71)m = \begin{array}{c c c c c c c c c c c c c c c c c c c $	(71)
Water heating gains (Table 5)	
(72)m= 84.09 82.36 78.76 73.86 70.69 66.21 62.41 67.28 69.01 74.08 79.8 82.36	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$	(/
(73)m= 296.07 294.4 284.67 269.09 253.54 238.32 228.28 233.09 240.95 256.7 274.79 288.11	(73)
6. Solar gains:	()
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.	
Orientation: Access Factor Area Flux g_ FF Gains	
Table 6dm²Table 6aTable 6bTable 6c(W)	
Southeast 0.9x 0.77 x 7.91 x 36.79 x 0.5 x 0.85 = 85.72	(77)
Southeast 0.9x 0.77 x 7.91 x 62.67 x 0.5 x 0.85 = 146.01](77)
Southeast 0.9x 0.77 x 7.91 x 85.75 x 0.5 x 0.85 = 199.78](77)
Southeast 0.9x 0.77 x 7.91 x 106.25 x 0.5 x 0.85 = 247.53](77)
Southeast 0.9x 0.77 x 7.91 x 119.01 x 0.5 x 0.85 = 277.26	(77)

					_										_
Southeast 0.9x	0.77	x	7.9	91	×	11	8.15	x		0.5	x	0.85	=	275.25	(77)
Southeast 0.9x	0.77	x	7.9	91	x	11	3.91	x		0.5	x	0.85	=	265.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	10	4.39	x		0.5	x	0.85	=	243.2	(77)
Southeast 0.9x	0.77	x	7.9	91	x	92	.85	x		0.5	x	0.85	=	216.32	(77)
Southeast 0.9x	0.77	x	7.9	91	x	69	.27	x		0.5	x	0.85	=	161.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	44	.07	x		0.5	x	0.85	=	102.67	(77)
Southeast 0.9x	0.77	x	7.9	91	x	31	.49	x		0.5	x	0.85	=	73.36	(77)
Southwest0.9x	0.77	x	4.2	25	x	36	.79]		0.5	x	0.85	=	46.06	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	36	.79]		0.5	x	0.85	=	48.33	(79)
Southwest0.9x	0.77	x	4.2	25	x	62	67			0.5	x	0.85	=	78.45	(79)
Southwest0.9x	0.77	x	4.4	16	x	62	67]		0.5	x	0.85	=	82.33	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	85	.75	1		0.5	x	0.85	= =	107.34	(79)
Southwest _{0.9x}	0.77	x	4.4	16	×	85	.75	1		0.5	x	0.85	=	112.64	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	10	6.25	1		0.5	x	0.85	=	133	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	10	6.25	1		0.5	x	0.85	= =	139.57	(79)
Southwest _{0.9x}	0.77	x	4.2	25	×	11	9.01	1		0.5	x	0.85	=	148.97	(79)
Southwest _{0.9x}	0.77	x	4.4	46	×	11	9.01	1		0.5	x	0.85	=	156.33	(79)
Southwest0.9x	0.77	x	4.2	25	×	11	8.15			0.5	x	0.85	=	147.89	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.4	46	x	11	8.15	İ.		0.5	x	0.85	-	155.2	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	x	11	3.91	i /		0.5	x	0.85	=	142.58	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	×	11	3.91	i/		0.5	x	0.85	=	149.63	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	хГ	10	4.39	Í		0.5	x	0.85		130.67	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	x	10	4.39	1		0.5	x	0.85	= =	137.13	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.2	25	x	92	85	1		0.5	x	0.85	= =	116.23	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	92	85	1		0.5	×	0.85	=	121.97	(79)
Southwest _{0.9x}	0.77	×	4.2	25	×	69	.27	1		0.5	×	0.85	=	86.7	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	69	.27	1		0.5	×	0.85	=	90.99	(79)
Southwest _{0.9x}	0.77	×	4.2	25	×	44	.07	1		0.5	×	0.85	=	55.16	(79)
Southwest _{0.9x}	0.77	x	4.4	46	×	44	.07	1		0.5	×	0.85	=	57.89	(79)
Southwest0.9x	0.77	x	4.2	25	×	31	.49	1		0.5	×	0.85	=	39.41	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	31	.49	1		0.5	×	0.85	=	41.36	(79)
Solar gains in	watts, ca	lculated	d for eac	h month	า			(83)m	n = Su	m(74)m .	(82)m		-	_	
(83)m= 180.11	306.79	419.76	520.1	582.56		3.35	557.59	510	.99	454.51	339.07	215.73	154.13		(83)
Total gains –	internal a	nd sola	r (84)m =	= (73)m	+ (83	3)m ,	watts					-		-	
<mark>(84)m=</mark> 476.18	601.19	704.43	789.19	836.1	816	6.66	785.86	744	.08	695.46	595.77	490.52	442.24		(84)
7. Mean inte	rnal temp	erature	(heating	seasor	ר)										
Temperature	during h	eating p	periods in	n the livi	ing a	rea fr	om Tal	ole 9,	, Th1	(°C)				21	(85)
Utilisation fa	ctor for ga	ains for	living are	ea, h1,n	n (see	e Tab	ole 9a)								
Jan	Feb	Mar	Apr	May	J	un	Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.95	0.88	0.73	0.56	0.3	39	0.28	0.3	31	0.49	0.8	0.96	0.99		(86)
Mean interna	al tempera	ature in	living ar	ea I1 (f	ollow	/ step	s 3 to i	ini	able	9c)					
Mean interna (87)m= 20.21	al tempera 20.48	ature in 20.73	living ar	ea 11 (f 20.98	1	/ step 21	21 s 3 to	2 ¹	1	9C) 20.99	20.89	20.54	20.18]	(87)

Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	20.05	20.05	20.06	20.08	20.08	20.11	20.11	20.11	20.1	20.08	20.07	20.07		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.98	0.94	0.85	0.69	0.51	0.33	0.22	0.25	0.43	0.75	0.95	0.99		(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=	19.03	19.4	19.74	20	20.07	20.1	20.11	20.11	20.09	19.98	19.51	18.99		(90)
			•			•	•	•	f	iLA = Livin	ng area ÷ (4) =	0.61	(91)
Mean	interna	l temper	ature (fc	or the wh	ole dwe	llina) = f	LA x T1	+ (1 – fL	_A) × T2					
(92)m=	19.75	20.05	20.34	20.56	20.63	20.65	20.65	20.65	20.64	20.54	20.13	19.71		(92)
Apply	adjustr	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.75	20.05	20.34	20.56	20.63	20.65	20.65	20.65	20.64	20.54	20.13	19.71		(93)
8. Spa	ace hea	ting req	uirement											
						ned at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calo	culate	
the ut	Jan	Feb	Mar	using Ta Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm		Iviay	Jun	Jui	_ Aug	0ep			Dec		
(94)m=	0.98	0.94	0.86	0.71	0.54	0.37	0.26	0.28	0.47	0 <mark>.77</mark>	0.95	0.98		(94)
	L Il gains,	hmGm	W = (9	1 4)m x (8 [,]	1 4)m				1		<u> </u>	L		
(95)m=	465.54	564.14	605.38	561.19	448.2	299.73	201.01	209.86	325.85	460.37	464.29	434.95		(95)
Mo <mark>nt</mark> ł	nly aver	age ex <mark>te</mark>	ernal terr	perature	e from Ta	able 8		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		(96)
	los <mark>s rate</mark>	e for me	an interr	· · ·		Lm , W =	=[(<mark>3</mark> 9)m	x [(93)m	– (96)m	-				
(97)m=	820.5	800.76	727.79	597.43	455.07	300.33	201.07	209.96	328.26	50 <mark>6.5</mark> 4	671.39	807.23		(97)
			1	1			1	1) <mark>m – (9</mark> 5 I		1	1		
(98)m=	264.09	159.01	91.07	26.09	5.11	0	0	0	0	34.35	149.11	276.97		
								Tota	al per year	(kWh/yea	r) = Sum(9	8)15,912 =	1005.81	(98)
Space	e heatin	g require	ement in	kWh/m ²	?/year								19.72	(99)
9b. En	ergy rec	quiremer	nts – Coi	mmunity	heating	scheme)							
•						•		•••	vided by		unity scł	neme.	-	(204)
						-	-		1) '0' if n	one			0	(301)
Fractio	on of spa	ace heat	from co	mmunity	' system	1 – (30′	1) =						1	(302)
	-									up to four	other heat	sources; t	he latter	
		• •	-	mal and wa ity boileı		rom powe	r stations.	See Appe	nuix C.				1	(303a)
				m Comn		oilers				(3	02) x (303	a) =	1	(304a)
		•			•		or comm	unitv hea	ating sys			,	1	(305)
				2c) for c					5-7-				1.05	(306)
	heatin		,	,		,	5,						kWh/ye	
•		-	requiren	nent									1005.81	
Space	heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	1056.1	(307a)
Efficier	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308

Space heating requirement from secondary/supplementary s	(98) x (301) x	: 100 ÷ (308) =	0	(309)
Space heating requirement norm secondary supplementary s		(000) =	0	
Water heating Annual water heating requirement			1502.43	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a)	x (305) x (306) =	1577.56	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	07e) + (310a)(310e)] =	26.34	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter	0) = (107) ÷ (314	4) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input fr	om outside		115.24	(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) =	115.24	(331)
Energy for lighting (calculated in Appendix L)			235.9	(332)
12b. CO2 Emissions – Community heating scheme				
	_			
CO2 from other sources of space and water heating (not CH	Energy kWh/year IP) using two fuels repeat (363) t	Emission factor kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	kWh/year	kg CO2/kWh	kg CO2/year](367a)](367)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	kWh/year IP) using two fuels repeat (363) t	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367) (372)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution Total CO2 associated with community systems	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373) (374)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x raneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373) (374) (375)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x raneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh xo (366) for the second fue 0.22 0.52 72) 0 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dw	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x aneous heater (312) x (373) + (374) + (375) = velling (331)) x	kg CO2/kWh 0 (366) for the second fue 0.22 0.52 72) 0 0.22 0 0.22 0 0.22 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dw CO2 associated with electricity for lighting	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x aneous heater (312) x (373) + (374) + (375) = velling (331)) x	kg CO2/kWh 0 (366) for the second fue 0.22 0.52 72) 0 0.22 0 0.22 0 0.22 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376) (378) (379)

User Details:		
	n: 1.0.4.14	
Property Address: Flat 1-03		
Address :		
1. Overall dwelling dimensions:		
Area(m²)Av. Height(m)Ground floor 72 (1a) x 3.08 (2a) = [Volume(m ³)	(3a)
	221.4	(3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ [4] Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = [1
Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) =$	221.4	(5)
2. Ventilation rate:	m3 nor hour	
main secondary other total heating heating	m ³ per hour	
Number of chimneys $0 + 0 + 0 = 0 \times 40 = 0$	0	(6a)
Number of open flues 0 + 0 = 0 × 20 = []	0	(6b)
Number of intermittent fans 0 x 10 =	0	(7a)
Number of passive vents 0 x 10 =	0	(7b)
Number of flueless gas fires 0 x 40 =	0	(7c)
Air cha	ange <mark>s per</mark> hou	ır
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0 \div (5) = 0$	0	(8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)		1
Number of storeys in the dwelling (ns) Additional infiltration [(9)-1]x0.1 =	0	(9) (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 greater wall area (after	0]()
deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		1
If no draught lobby, enter 0.05, else enter 0	0	(12)
Percentage of windows and doors draught stripped	0	(13) (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 hour per square metre of envelope area	4	(17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.2	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used].
Number of sides sheltered	0	(19)
Shelter factor (20) = 1 - [0.075 x (19)] =	1	(20)
Infiltration rate incorporating shelter factor (21) = (18) x (20) =	0.2	(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		
(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		

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	-		_	
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24	ĺ	
		<i>ctive air</i> al ventila	0	rate for t	he appli	cable ca	se							(23a)
				endix N. (2	3b) = (23a	a) x Fmv (e	equation (N5)) , othei	wise (23b) = (23a)			0.5	
			• • •		, ,	, ,		n Table 4h		, (,			76.5	
			-	-	-			HR) (24a		2h)m + (23h) v [[,]	1 <u>- (23c</u>)) (200)
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35	÷ 100]	(24a)
								MV) (24b				0.00	i	· · · ·
(24b)m=	r			0	0			0	0	0	0	0	I	(24b)
								n from c		ů	ů	ů	i	· · · ·
,					•	•		c) = (22b		5 x (23b))			
(24c)m=	<u> </u>	0	0	0	0	0	0	0	0	0	0	0		(24c)
		ı ventilatio	n or wh	l ole hous	e positiv	l /e input :	ı ventilatio	n from l	oft				1	
,								0.5 + [(2		0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	(25)	-		-		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
3 He	at losse	s and he	at loss i	oaramete	or:									
ELEN		Gros		Openin		Net Ar	ea	U-valu	le	AXU		k-value	<u>ــــــــــــــــــــــــــــــــــــ</u>	AXk
		area		m		A ,r		W/m2		(W/I	K)	kJ/m ² ·l		kJ/K
Doo <mark>rs</mark>						1.8	x	1.3	= [2.34				(26)
Windo	ws Type	e 1				5.27	x1.	/[1/(1.1)+	0.04] =	5.55				(27)
Windo	ws Type	e 2				1.52	x1.	/[1/(1.1)+	0.04] =	1.6	F			(27)
Windo	ws Type	e 3				9		/[1/(1.1)+	0.04] =	9.48	5			(27)
	ws Type					2.57	_ ,	/[1/(1.1)+	L	2.71	=			(27)
Walls		63.3	22	18.3	6	44.96		0.15		6.74				(29)
Walls									=		╡╏		\dashv	
		4.7		1.8		2.93		0.17	= [0.49				(29)
		elements				68.05		. fa	15/4/11	a) 0.041 a				(31)
				nternal wal			ated using	formula 1,	/[(1/ U- valu	ie)+0.04] a	is given in	paragrapr	13.2	
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				28.9	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	8747	<u>.5 (34)</u>
Therm	al mass	parame	ter (TMI		- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	
For desi	ign asses:	sments wh	ere the de	tails of the	construct	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f	1]、 /
		ad of a de												
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						6.6	1 (36)
			are not kr	own (36) =	= 0.15 x (3	1)			(22)	(20)				(07)
	abric he		- - 4	l						(36) =	05)		35.5	3 (37)
ventila	r	1	r	monthl		1	11	Δ		= 0.33 × (r	1	1	
(20)~	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec 25.75	1	(38)
(38)m=	27.22	26.85	26.48	24.66	24.29	22.47	22.47	22.1	23.2	24.29	25.02	25.75	i	(00)
	r	coefficier	r							= (37) + (3	· ·		1	
(39)m=	62.74	62.38	62.01	60.19	59.82	57.99	57.99	57.63	58.72	59.82	60.55	61.28		
										Average =	oum(39)₁	12 / IZ=	60.0	9 (39)

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.87	0.87	0.86	0.84	0.83	0.81	0.81	0.8	0.82	0.83	0.84	0.85		
L			1					1	,	Average =	Sum(40)1	12 /12=	0.83	(40)
	Jan	Feb	nth (Tab 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)
(,	01	20			01					01		01		()
4. Wa	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF	A > 13.9	upancy, 9, N = 1 9, N = 1		:[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		29		(42)
Reduce	the annua	al average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve	+ 36 a water us	se target o		.68		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	97.54	94	90.45	86.9	83.35	79.81	79.81	83.35	86.9	90.45	94	97.54		
Energy c	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor		m(44) ₁₁₂ = ables 1b, 1		1064.1	(44)
(45)m=	144.65	126.51	130.55	113.82	109.21	94.24	87.33	100.21	101.41	118.18	129	140.09		_
lf instant	aneous w	ater heati	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1395.2	(45)
(46)m=	21.7	18.98	19.58	17.07	16.38	14.14	13.1	15.03	15.21	17.73	19.35	21.01		(46)
Water s		loss:												
-				-					a <mark>me ve</mark> s	sel		2		(47)
		•	and no ta		•			· ·		or (0' in ((17)			
Water s			not wate	er (unis ir	iciudes i	nstantar	leous co	ווסם ומחזכ	ers) ente	er U in (47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(48) x (49)) =			2		(50)
•			eclared o	•									1	
		-	factor fr		e 2 (kW	h/litre/da	ay)				0.	03		(51)
		from Ta		011 4.5							3	91		(52)
			m Table	2b								.6		(53)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	0.	13		(54)
•••		(54) in (5	-									13		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = ((55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	s 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	lix H	
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
Primary	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary	y circuit	loss cal	culated	for each	month (,	• •	65 × (41)					-	
, L	-	1	r	i	1	1	i	<u> </u>	a cylinde	1	, 	i	I	
(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 eac	h r	month (61)m =	(60	D) ÷ 36	65 × (41))m						_	
(61)m=	0	0	0		0	0		0	0	0	0		0	0	0		(61)
Total h	neat req	uired for	water l	hea	ating ca	alculated	d fo	or eacl	n month	(62)m	= 0.85	× (•	45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		(62)
Solar DI	HW input	calculated	using Ap	per	ndix G or	Appendi	ĸН	(negativ	ve quantity	/) (ente	'0' if no s	olar	contribut	ion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	Sa	nd/or V	VWHRS	S ap	oplies,	, see Ap	pendi	(G)						
(63)m=	0	0	0		0	0		0	0	0	0		0	0	0		(63)
Output	t from w	vater hea	ter														
(64)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		
		-								C	utput from	ו wa	ter heate	r (annual)₁	12	1716.97	(64)
Heat g	jains fro	m water	heating	g, k	(Wh/mo	onth 0.2	5 ′	[0.85	× (45)m	+ (61)m] + 0.	8 x	[(46)m	+ (57)m	+ (59)m]	
(65)m=	69.96	61.81	65.27	Τ	59	58.18	5	52.49	50.9	55.18	54.8	7	61.16	64.05	68.44		(65)
inclu	ude (57))m in calo	culation	l of	ⁱ (65)m	only if c	ylin	nder is	s in the c	dwellir	g or hot	t wa	ater is fi	rom com	munity h	leating	
5. In	ternal q	ains (see	e Table	5 a	and 5a)):	-				-				-	_	
	Ŭ	ns (Table			,												
metab	Jan	Feb	Mar		, Apr	May	Γ	Jun	Jul	Au	g Se	р	Oct	Nov	Dec		
(66)m=	114.68	114.68	114.68		114.68	114.68	1	14.68	114.68	114.6			114.68	114.68	114.68		(66)
Lightin		(calcula		_		equal	tion	190	(19a) a								
(67)m=	18	15.99	13	T	9.84	7.36	-	6.21	6.71	8.73		- 1	14.87	17.36	18.5		(67)
	L	ains (calc		in									_		10.0	l i	
(68)m=	201.92	<u> </u>	198.73	_	187.49	173.3		59.97	151.06	148.9		- 1	165.48	179.67	193.01	1	(68)
· ·	L		<u> </u>	_			-						_	175.07	100.01		(00)
(69)m=	34.47	s (calcula 34.47	34.47	_	34.47	L, equa 34.47	-	34.47	34.47	, also 34.4			34.47	34.47	34.47	1	(69)
						54.47		04.47	34.47	54.4	54.4	1	34.47	34.47	34.47		(00)
-		ins gains	r`	58			-	-	-							1	(70)
(70)m=	0	0	0		0	0		0	0	0	0		0	0	0		(70)
	<u> </u>	vaporatic	<u> </u>	-		, ,	1	,						r		1	(
(71)m=	-91.75	-91.75	-91.75		-91.75	-91.75	-9	91.75	-91.75	-91.7	5 -91.7	'5	-91.75	-91.75	-91.75		(71)
Water		gains (T	able 5	_			_							,		1	
(72)m=	94.03	91.98	87.73		81.95	78.19	7	72.91	68.41	74.17	76.2	2	82.2	88.96	91.99		(72)
Total i	interna	l gains =	:				_	(66)	m + (67)m			+ (70)m + (7	'1)m + (72))m		
(73)m=	371.36	369.39	356.87		336.69	316.26	2	96.49	283.59	289.2	6 299.5	58	319.96	343.39	360.91		(73)
	lar gain																
		calculated	•	lar f		Table 6a	and		•	tions to	convert to	o the	e applicat		tion.		
Orient		Access F Table 6d			Area m²			Flu	x ole 6a		g_ Table 6	sh	т	FF able 6c		Gains (W)	
				-	111-			1 ai			Table	50	, , ,			(**)	-
	ast <mark>0.9x</mark>	0.77	:	×Ĺ	9		x	1	1.28	×	0.5		×	0.85	=	29.91	(75)
	ast <mark>0.9x</mark>	0.77		×	9		x	2	2.97	×	0.5		x	0.85	=	60.88	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	4	1.38	×	0.5		_ × [0.85	=	109.68	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	6	7.96	×	0.5		x	0.85	=	180.13	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	9	1.35	×	0.5		x	0.85	=	242.13	(75)

Northeast 0.9x	0.77) ×	9	×	97.38	x	0.5	x	0.85	=	258.14	(75)
Northeast 0.9x	0.77	x	9	x	91.1	x	0.5	x	0.85	=	241.48	(75)
Northeast 0.9x	0.77	x	9	x	72.63	x	0.5	x	0.85	=	192.51	(75)
Northeast 0.9x	0.77	」 】 ×	9	x	50.42	x	0.5	x	0.85	=	133.65](75)
Northeast 0.9x	0.77	l x	9	x	28.07	x	0.5	x	0.85	=	74.4](75)
Northeast 0.9x	0.77	x	9	x	14.2	x	0.5	x	0.85	=	37.63	(75)
Northeast 0.9x	0.77	x	9	x	9.21	x	0.5	x	0.85	=	24.42	(75)
Southwest _{0.9x}	0.77	x	5.27	x	36.79		0.5	x	0.85	=	57.11	(79)
Southwest _{0.9x}	0.77	x	5.27	x	62.67		0.5	x	0.85	=	97.28	(79)
Southwest0.9x	0.77	x	5.27	x	85.75		0.5	x	0.85	=	133.1	(79)
Southwest _{0.9x}	0.77	×	5.27	×	106.25		0.5	x	0.85	=	164.92	(79)
Southwest _{0.9x}	0.77	x	5.27	x	119.01		0.5	x	0.85	=	184.72	(79)
Southwest _{0.9x}	0.77	x	5.27	×	118.15		0.5	x	0.85	=	183.39	(79)
Southwest _{0.9x}	0.77	x	5.27	x	113.91		0.5	x	0.85	=	176.8	(79)
Southwest _{0.9x}	0.77	x	5.27	x	104.39		0.5	x	0.85	=	162.03	(79)
Southwest _{0.9x}	0.77	×	5.27	x	92.85		0.5	x	0.85	=	144.12	(79)
Southwest _{0.9x}	0.77	x	5.27	x	69.27		0.5	x	0.85	=	107.51	(79)
Southwest _{0.9x}	0.77	x	5.27	×	44.07		0.5	x	0.85	=	68.4	(79)
Southwest0.9x	0.77	x	5.27	х	31.49		0.5	x	0.85	=	48.87	(79)
Northwest 0.9x	0.77	x	1.52	x	11.28	×	0.5	x	0.85	=	5.05	(81)
Northwest 0.9x	0.77	×	2.57	x	11.28	x	0.5	x	0.85	=	8.54	(81)
Northwest 0.9x	0.77	x	1.52	×	22.97	х	0.5	x	0.85	=	10.28	(81)
Northwest 0.9x	0.77	×	2.57	x	22.97	X	0.5	x	0.85	=	17.38	(81)
Northwest 0.9x	0.77	×	1.52	×	41.38	x	0.5	x	0.85	=	18.52	(81)
Northwest 0.9x	0.77	×	2.57	×	41.38	x	0.5	x	0.85	=	31.32	(81)
Northwest 0.9x	0.77	x	1.52	×	67.96	x	0.5	x	0.85	=	30.42	(81)
Northwest 0.9x	0.77	×	2.57	x	67.96	x	0.5	x	0.85	=	51.44	(81)
Northwest 0.9x	0.77	x	1.52	x	91.35	x	0.5	X	0.85	=	40.89	(81)
Northwest 0.9x	0.77	x	2.57	×	91.35	x	0.5	x	0.85	=	69.14	(81)
Northwest 0.9x	0.77	x	1.52	X	97.38	x	0.5	x	0.85	=	43.6	(81)
Northwest 0.9x	0.77	x	2.57	X	97.38	x	0.5	x	0.85	=	73.71	(81)
Northwest 0.9x	0.77	x	1.52	×	91.1	x	0.5	x	0.85	=	40.78	(81)
Northwest 0.9x	0.77	×	2.57	X	91.1	X	0.5	x	0.85	=	68.96	(81)
Northwest 0.9x	0.77	X	1.52	X	72.63	X	0.5	x	0.85	=	32.51	(81)
Northwest 0.9x	0.77	X	2.57	X	72.63	X	0.5	X	0.85	=	54.97	(81)
Northwest 0.9x	0.77	×	1.52	X	50.42	X	0.5	X	0.85	=	22.57	(81)
Northwest 0.9x	0.77	×	2.57	×	50.42	X	0.5	x	0.85	=	38.16	(81)
Northwest 0.9x	0.77	×	1.52	×	28.07	X	0.5	X	0.85	=	12.57	(81)
Northwest 0.9x	0.77	X	2.57	×	28.07	X	0.5	X	0.85	=	21.24	(81)
Northwest 0.9x	0.77	X	1.52	×	14.2	X	0.5	x	0.85	=	6.36	(81)
Northwest 0.9x	0.77	×	2.57	×	14.2	x	0.5	x	0.85	=	10.75	(81)

Northwest $0.9x$ 0.77 x 2.57 x 9.21 x 0.5 x 0.85 = (6.97 (61)) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 100.61 185.82 202.63 242.03 58.89 558.84 528.03 442.03 338.51 215.72 123.14 84.4 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (64)m = 471.97 555.21 649.5 763.6 853.15 855.33 811.62 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, 11,m (see Table 9a) Utilisation factor for gains for living area 11 (follow steps 3 to 7 in Table 9c) (67)m 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (67) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (68)m 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (68) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (69)m 21 0.98 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.99 0.91 0.99 1 (69) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (60)m 1 0.98 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.99 0.91 0.99 1 (7A) (7A) 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92
Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 471.97 555.21 649.5 763.6 853.15 855.33 811.82 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 7. Mean internal temperature (heating season) 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m 20.21 20.32 20.24 20.23 20.22 20.21 (88) Wean internal temperature in living area of dwelling from Table 9. Th2 (°C) (89) (80) (80) (80)
(64)m= 471.97 555.21 64.9.5 763.6 853.15 855.33 811.62 731.29 638.08 535.68 466.53 445.31 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, h1,m (see Table 9a) Lan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (80)m= 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) (87)m= 20.21 20.37 20.62 20.89 21 21 21 20.99 1.0 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (89)m= 1 0.99 0.81 0.59 0.31 0.56 0.9 9 1 (99) (91)<
7. Mean internal temperature (heating season) 7. Mean internal temperature (uring 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) (86)m= 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.21 20.37 20.62 20.89 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (88) (89)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) 10.4 19.54 19.12 (90)
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 (80)me 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.21 (88) 1 0.99 0.95 0.81 0.59 0.31 0.56 0.9 0.9 1 (90) (Balminternal temperature in the rest of dwelling) = fLA × T1 + (1 - fLA) × T2 (90) (81) 0.52 (91) (92)
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 (80)me 1 0.99 0.96 0.85 0.64 0.43 0.31 0.36 0.62 0.92 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 20.21 20.37 20.62 20.89 20.98 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.21 (88) 1 0.99 0.95 0.81 0.59 0.31 0.56 0.9 0.9 1 (90) (Balminternal temperature in the rest of dwelling) = fLA × T1 + (1 - fLA) × T2 (90) (81) 0.52 (91) (92)
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) Mean internal temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (87) (88) 20.19 20.2 20.2 20.22 20.23 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89) 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 1 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90) 1 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92) FLA = Living area + (4) = 0.52 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m
(87)m= 20.21 20.37 20.62 20.89 21 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 1 1.12 (90) (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (92) (93)me 19.69 19.89 20.19 20.51 20.64 20.64<
(87)m= 20.21 20.37 20.62 20.89 21 21 21 21 20.99 20.82 20.48 20.19 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.2 20.22 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (80)m= 19.13 19.38 19.73 20.1 20.21 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.64 20.6
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.19 20.2 20.21 (88) Utilisation factor for gains for rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (91) (92) $FLA = Living area \pm (4) =$ 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92) (93) (94) (92) (94) (92) (94) (92) (94) (93) (94) (94) (93) (94
(88)m= 20.19 20.2 20.2 20.23 20.25 20.25 20.24 20.23 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m= 19.13 19.33 19.73 20.1 20.21 20.25 20.25 20.22 20.44 20.03 19.54 19.12 (90) (90)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.64 20.42 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) 8 Space heating requirement (93) 8 Space heating requirement (93) 8 Span Apr May Jun
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 1 0.99 0.95 0.81 0.59 0.38 0.26 0.3 0.56 0.9 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) (90)m = 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (92) (93)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (93) 8 Set Ti to the mean internal tempera
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) fLA = Living area \div (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (93) 8. Space heating requirement (93)m= 19.69 19.89 20.19 20.51 20.64 20.64 20.62 20.44 20.03 19.68 (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) Jan Feb Mar Apr May
(90)m= 19.13 19.38 19.73 20.1 20.21 20.25 20.25 20.23 20.03 19.54 19.12 (90) fLA = Living area ÷ (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) 19.69 19.89 20.19 20.51 20.61 20.64 20.62 20.44 20.03 19.68 (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) Useful gains, hmGm, W = (94)m x (84)m (94)
fLA = Living area \div (4) = 0.52 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) (93) 8. Space heating requirement (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) Useful gains, hmGm , W = (94)m x (84)m (94) (94) (94)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$ (92) (92)m = 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) (93) (93) (93) (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 (93) (94) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94)
(92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Image: start is the start is
(92)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m Image: start is the start is
(93)m= 19.69 19.89 20.19 20.51 20.61 20.64 20.64 20.62 20.44 20.03 19.68 (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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (94)m x (84)m
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= 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (94)m x (84)m
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculatethe utilisation factor for gains using Table 9aJanFebMarAprMayJunJulAugSepOctNovDecUtilisation factor for gains, hm: $(94)m=$ 0.990.980.950.830.610.410.290.330.590.910.991(94)Useful gains, hmGm , W = (94)m x (84)m
the utilisation factor for gains using Table 9a $\begin{array}{c c c c c c c c c c c c c c c c c c c $
JanFebMarAprMayJunJulAugSepOctNovDecUtilisation factor for gains, hm: $(94)m=$ 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1(94)Useful gains, hmGm , W = (94)m x (84)m
Utilisation factor for gains, hm: $(94)m=$ 0.99 0.98 0.95 0.83 0.61 0.41 0.29 0.33 0.59 0.91 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Useful gains, hmGm , W = (94)m x (84)m
(30) = 1409.52 1 340.70 1 017.4 1 050.37 1 325.74 1 349.01 1 254.15 1 244.24 1 377.90 1 404.9 1 439.00 1 445.40 1 (30)
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 , $W = [(39)m \times [(93)m - (96)m]$
(97) m = 965.48 935.27 849.15 698.58 533.1 350.11 234.17 244.33 383.17 588.79 782.65 948.48
Space heating requirement for each month, kWh/month = $0.024 \times [(97)m - (95)m] \times (41)m$
(98)m= 369.14 261.07 172.42 48.97 6.96 0 0 0 0 77.29 232.39 375.72
Total per year (kWh/year) = Sum(98) _{15,912} = 1543.96 (98)
Total per year $(kWh/year) = Sum(98)_{15,912} = 1543.96$ (98)Space heating requirement in kWh/m²/year21.44 (99)

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 he	ating (Table '	1) '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 pro- includes boilers, heat pumps, geothermal and waste heat from power s	ocedure allows fo	•	our other heat sour	rces; the		_
Fraction of heat from Community boilers					1	(303a)
Fraction of total space heat from Community boilers			(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for a	community he	ating system			1	(305)
Distribution loss factor (Table 12c) for community heating	system				1.05	(306)
Space heating Annual space heating requirement				Γ	kWh/year 1543.96]
Space heat from Community boilers		(98) x (304a) x ((305) x (306) =		1621.16	(307a)
Efficiency of secondary/supplementary heating system in	% (from Tab	e 4a or Append	dix E)		0	(308
Space heating requirement from secondary/supplementa	ry system	(98) x (301) x 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement				Γ	1716.97]
If DHW from community scheme: Wat <mark>er heat from Community boilers</mark>		(64) x (303a) x ((305) x (306) =		1802.82	(310a)
Electricity used for heat distribution	0.0	1 × [(307a)(307e	e) + <mark>(310a)(310e</mark>	e)] =	34.24	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling system, if not en	ter 0)	= (107) ÷ (314) =	=		0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input	it from outside	9		Γ	204.2	(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) =		204.2	(331)
Energy for lighting (calculated in Appendix L)					317.91	(332)
12b. CO2 Emissions – Community heating scheme						-
		ergy /h/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heating (not Efficiency of heat source 1 (%) If there is C		ls repeat (363) to ((366) for the secor	nd fuel	92	(367a)
CO2 associated with heat source 1	(307b)+(310b)] x	100 ÷ (367b) x	0.22	=	803.89	(367)
Electrical energy for heat distribution	[(313) x		0.52	=	17.77	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	=	821.66	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or inst	antaneous he	ater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		-	821.66	(376)
CO2 associated with electricity for pumps and fans within	dwelling (33	1)) x	0.52	=	105.98	(378)

CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	164.99	(379)
Total CO2, kg/year	sum of (376)(382) =				1092.64	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.18	(384)
El rating (section 14)					87.49	(385)
						-



			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 2012	_		Stroma Softwa	re Ver	sion:		Versio	on: 1.0.4.14	
		Pr	operty A	Address:	Flat 2-0)1				
Address :										
1. Overall dwelling dimer	isions:			()						
Ground floor			Area		(4 -)		ight(m)		Volume(m ³	<i>.</i>
	· / / · · / · · / / · · / · · · / ·				(1a) x	3	.15	(2a) =	160.65	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)	+(1n))	51	(4)					_
Dwelling volume					(3a)+(3b))+(3C)+(30	l)+(3e)+	.(3h) =	160.65	(5)
2. Ventilation rate:				4					<u>, ,</u>	
		condary eating		other		total			m ³ 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 fan	S					0	×	10 =	0	(7a)
Number of passive vents						0	X	10 =	0	(7b)
Number of flueless gas fire	es					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimney						0		÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in the		d, proceed	to (17), o	otherwise c	ontinue fro	om (9) to ((16)			
Additional infiltration	s dweining (ns)						[(9)	-1]x0.1 =	0	(9)
Structural infiltration: 0.2	25 for steel or timber fr	rame or	0.35 for	masonr	y constr	uction			0	(11)
•• •	esent, use the value corresp	onding to	the greate	er wall area	a (after					
deducting areas of opening If suspended wooden flo		ad) or 0 (1 (00010	d) alaa	ontor O					
If no draught lobby, ente		eu) or 0.	i (Seale	u), eise					0	(12)
Percentage of windows		inned							0	(13)
Window infiltration		ippou		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value, c	50, expressed in cubi	c metres	s per ho	ur per so	quare m	etre of e	nvelope	area	4	(17)
If based on air permeabilit	y value, then (18) = [(17	') ÷ 20]+(8)), otherwis	se (18) = (16)				0.2	(18)
Air permeability value applies		been done	e or a deg	ree air per	meability	is being u	sed			
Number of sides sheltered	1			(20) = 1 - [0 075 v (1	0)1			0	(19)
Shelter factor	a abaltar factor			(20) = 1 - [(21) = (18)		9)] =			1	(20)
Infiltration rate incorporation	-			(21) = (10)	x (20) =				0.2	(21)
Infiltration rate modified fo		lun	Jul	Aug	Son	Oct	Nov	Dec	1	
		Jun	Jui	Aug	Sep	OCI		Dec		
Monthly average wind spe		2.0	2.0	2.7	4	4.2	4.5	47	1	
(22)m= 5.1 5 4	1.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	J	
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		

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_		
	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24			
		ctive air	-	rate for t	he appli	cable ca	se	-		-	-				
		al ventila		ondix NL (2	(2b) = (22c)		oquation (I	N5)) , othe	nuico (22h) - (220)				.5	(23a)
		• •	0 11		, (, ,	• •	,, -	`) = (23a)				.5	(23b)
			-	-	_			n Table 4h		,				6.5	(23c)
		1		i	i	i	<u> </u>	<u> </u>	ŕ	, <u>,</u>	· · ·	1 – (23c)	÷ 100] I		(0.4.5)
(24a)m=		0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(24a)
		1		1	1	1		MV) (24b	ŕ	r í	, 	1	1		
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
,					•	•		on from c c) = (22b		5 × (23b)				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
,					•			on from l 0.5 + [(2		0.5]					
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b) or (24	c) or (24	d) in boy	k (25)				1		
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35			(25)
0.115	et lesses								1			_		_	
		s and he				Net Ar		U-valı		AXU		kyolus		Δ,	Xk
ELEN		Gros area		Openin m		A,r		W/m2		A X U (W/I	<)	k-value kJ/m²·l		kJ/	
Doors						1.8	x	1.3	=	2.34					(26)
Windo	ws Type	e 1				7.91	x1	/[1/(1.1)+	0.04] =	8.33	F				(27)
	ws Type					4.25		/[1/(1.1)+	<u> </u>	4.48	Ħ				(27)
	ws Type					4.46	—	/[1/(1.1)+	L	4.7	H.				(27)
Walls				10.0				0.15	I						(29)
		52.5		16.6	2	36.28				5.44					
Walls		4.7		1.8		2.93		0.17	=	0.49					(29)
		elements				57.63			<i></i>						(31)
		l roof wind as on both					ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	is given in	n paragraph	1 3.2		
		ss, W/K :						(26)(30)) + (32) =				25	.78	(33)
		Cm = S(,					((28)	.(30) + (32	2) + (32a)	(32e) =		98.3	(34)
		parame	. ,	² = Cm ÷	- TFA) ir	n kJ/m²K				tive Value	· · ·			50.0	(35)
For des	ign asses:	•	ere the de	tails of the				recisely the	e indicative	values of	TMP in T	able 1f			
		es : S (L			using Ap	pendix I	K						7	57	(36)
	-	al bridging				-									
	abric he			()	·	,			(33) +	(36) =			33	.36	(37)
Ventila	ation 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=	19.75	19.48	19.22	17.89	17.63	16.3	16.3	16.04	16.83	17.63	18.16	18.69			(38)
Heat ti	ransfer o	coefficie	nt, W/K	-	-	-	-	-	(39)m	= (37) + (3	- 38)m	-	•		
(39)m=	53.11	52.84	52.58	51.25	50.99	49.66	49.66	49.39	50.19	50.99	51.52	52.05			
	L	!						<u>.</u>	•	Average =	Sum(39)	₁₂ /12=	51	.18	(39)

Heat lo	ss para	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.04	1.04	1.03	1	1	0.97	0.97	0.97	0.98	1	1.01	1.02		
Numbe	r of day	s in mo	nth (Tab	le 1a)					,	Average =	Sum(40)1.	12 /12=	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)
L													1	
4. Wa	ter heat	ing enei	rgy requi	rement:								kWh/ye	ear:	
if TF/				[1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (⁻	TFA -13		72]	(42)
Reduce t	the annua	l average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.04]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage ir	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					-	
(44)m=	82.54	79.54	76.54	73.54	70.54	67.54	67.54	70.54	73.54	76.54	79.54	82.54		_
Ener <mark>gy c</mark>	content of	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		900.48	(44)
(45)m=	122.41	107.06	110.48	96. <mark>32</mark>	92.42	79.75	73.9	84.8	85.81	100.01	109.17	118.55		_
lf instant:	aneous w	ator hoatii	na at noint	of use (no	hot water	storage)	enter () in	boxes (46		Total = Su	m(45) ₁₁₂ =		1180.67	(45)
(46)m=	18.36	16.06	16.57	14.45	13.86	11.96	11.08	12.72	12.87	15	16.37	17.78	1	(46)
· · /	storage		10.37	14.43	13.00	11.90	11.00	12.12	12.07	15	10.37	17.70		(40)
Storage	e volum	e (litres)	includir	ig any so	olar or M	/WHRS	storage	within sa	a <mark>me ve</mark> s	sel		2		(47)
		•	ind no ta		•			. ,						
			hot wate	er (this ir	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
	storage anufact		eclared l	oss facto	or is kno	wn (kWł	n/dav):					0]	(48)
,			m Table				, , , .					0		(49)
•			· storage		ear			(48) x (49)) =			2		(50)
			eclared o	•									1	
		•	factor fr		e 2 (kW	h/litre/da	ıy)				0.	03		(51)
	•	from Ta		511 4.5							3.	91		(52)
			m Table	2b							0			(53)
Energy	lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	0.	13		(54)
Enter ((50) or (54) in (5	55)								0.	13		(55)
Water s	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	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=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
-			nual) fro									0		(58)
-						,	. ,	65 × (41)		* * +	atat)			
· r					1	1	1	ng and a		1	, 	22.26	1	(59)
(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	l	(53)

$(61)m=$ 00000000000Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$ $(62)m=$ 149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(61) (62) (63) (64)
(62)m=149.74131.74137.8122.76119.75106.2101.23112.13112.26127.34135.61145.88Solar 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)	(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)
(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 0](64)
Output from water heater	(64)
(64)m= 149.74 131.74 137.8 122.76 119.75 106.2 101.23 112.13 112.26 127.34 135.61 145.88	(64)
Output from water heater (annual) 112 1502.43	
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= 62.56 55.34 58.6 53.18 52.59 47.67 46.43 50.06 49.69 55.11 57.45 61.28	(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= 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98 85.98	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 13.36 11.86 9.65 7.3 5.46 4.61 4.98 6.47 8.69 11.03 12.88 13.73	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 149.83 151.39 147.47 139.13 128.6 118.7 112.09 110.54 114.45 122.8 133.32 143.22	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 31.6 31.6 31.6 31.6 31.6 31.6 31.6 31.6	(69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	
$ (71)m = \begin{array}{c c c c c c c c c c c c c c c c c c c $	(71)
Water heating gains (Table 5)	
(72)m= 84.09 82.36 78.76 73.86 70.69 66.21 62.41 67.28 69.01 74.08 79.8 82.36	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$	(/
(73)m= 296.07 294.4 284.67 269.09 253.54 238.32 228.28 233.09 240.95 256.7 274.79 288.11	(73)
6. Solar gains:	()
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.	
Orientation: Access Factor Area Flux g_ FF Gains	
Table 6dm²Table 6aTable 6bTable 6c(W)	
Southeast 0.9x 0.77 x 7.91 x 36.79 x 0.5 x 0.85 = 85.72	(77)
Southeast 0.9x 0.77 x 7.91 x 62.67 x 0.5 x 0.85 = 146.01](77)
Southeast 0.9x 0.77 x 7.91 x 85.75 x 0.5 x 0.85 = 199.78](77)
Southeast 0.9x 0.77 x 7.91 x 106.25 x 0.5 x 0.85 = 247.53](77)
Southeast 0.9x 0.77 x 7.91 x 119.01 x 0.5 x 0.85 = 277.26	(77)

					_										_
Southeast 0.9x	0.77	x	7.9	91	×	11	8.15	x		0.5	x	0.85	=	275.25	(77)
Southeast 0.9x	0.77	x	7.9	91	x	11	3.91	x		0.5	x	0.85	=	265.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	10	4.39	x		0.5	x	0.85	=	243.2	(77)
Southeast 0.9x	0.77	x	7.9	91	x	92	.85	x		0.5	x	0.85	=	216.32	(77)
Southeast 0.9x	0.77	x	7.9	91	x	69	.27	x		0.5	x	0.85	=	161.37	(77)
Southeast 0.9x	0.77	x	7.9	91	x	44	.07	x		0.5	x	0.85	=	102.67	(77)
Southeast 0.9x	0.77	x	7.9	91	x	31	.49	x		0.5	x	0.85	=	73.36	(77)
Southwest0.9x	0.77	x	4.2	25	x	36	.79]		0.5	x	0.85	=	46.06	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	36	.79]		0.5	x	0.85	=	48.33	(79)
Southwest0.9x	0.77	x	4.2	25	x	62	67			0.5	x	0.85	=	78.45	(79)
Southwest0.9x	0.77	x	4.4	16	x	62	67]		0.5	x	0.85	=	82.33	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	85	.75	1		0.5	x	0.85	= =	107.34	(79)
Southwest _{0.9x}	0.77	x	4.4	16	×	85	.75	1		0.5	x	0.85	=	112.64	(79)
Southwest _{0.9x}	0.77	x	4.2	25	x	10	6.25	1		0.5	x	0.85	=	133	(79)
Southwest _{0.9x}	0.77	x	4.4	16	x	10	6.25	1		0.5	x	0.85	= =	139.57	(79)
Southwest _{0.9x}	0.77	x	4.2	25	×	11	9.01	1		0.5	x	0.85	=	148.97	(79)
Southwest _{0.9x}	0.77	x	4.4	46	×	11	9.01	1		0.5	x	0.85	=	156.33	(79)
Southwest0.9x	0.77	x	4.2	25	×	11	8.15			0.5	x	0.85	=	147.89	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.4	46	x	11	8.15	İ.		0.5	x	0.85	-	155.2	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	x	11	3.91	i /		0.5	x	0.85	=	142.58	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	×	11	3.91	i/		0.5	x	0.85	=	149.63	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.2	25	хГ	10	4.39	Í		0.5	x	0.85		130.67	(79)
Sout <mark>hwest</mark> 0.9x	0.77	×	4.4	16	x	10	4.39	1		0.5	x	0.85	= =	137.13	(79)
Sout <mark>hwest_{0.9x}</mark>	0.77	×	4.2	25	x	92	85	1		0.5	x	0.85	= =	116.23	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	92	85	1		0.5	×	0.85	=	121.97	(79)
Southwest _{0.9x}	0.77	×	4.2	25	×	69	.27	1		0.5	×	0.85	=	86.7	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	69	.27	1		0.5	×	0.85	=	90.99	(79)
Southwest _{0.9x}	0.77	×	4.2	25	×	44	.07	1		0.5	×	0.85	=	55.16	(79)
Southwest _{0.9x}	0.77	x	4.4	46	×	44	.07	1		0.5	×	0.85	=	57.89	(79)
Southwest0.9x	0.77	x	4.2	25	×	31	.49	1		0.5	×	0.85	=	39.41	(79)
Southwest _{0.9x}	0.77	×	4.4	46	×	31	.49	1		0.5	×	0.85	=	41.36	(79)
Solar gains in	watts, ca	lculated	d for eac	h month	า			(83)m	n = Su	m(74)m .	(82)m		-	_	
(83)m= 180.11	306.79	419.76	520.1	582.56		3.35	557.59	510	.99	454.51	339.07	215.73	154.13		(83)
Total gains –	internal a	nd sola	r (84)m =	= (73)m	+ (83	3)m ,	watts					_		-	
<mark>(84)m=</mark> 476.18	601.19	704.43	789.19	836.1	816	6.66	785.86	744	.08	695.46	595.77	490.52	442.24		(84)
7. Mean inte	rnal temp	erature	(heating	seasor	ר)										
Temperature	during h	eating p	periods in	n the livi	ing a	rea fr	om Tal	ole 9,	, Th1	(°C)				21	(85)
Utilisation fa	ctor for ga	ains for	living are	ea, h1,n	n (see	e Tab	ole 9a)								
Jan	Feb	Mar	Apr	May	J	un	Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.95	0.88	0.73	0.56	0.3	39	0.28	0.3	31	0.49	0.8	0.96	0.99		(86)
Mean interna	al tempera	ature in	living ar	ea I1 (f	ollow	/ step	s 3 to i	ini	able	9c)					
Mean interna (87)m= 20.21	al tempera 20.48	ature in 20.73	living ar	ea 11 (f 20.98	1	/ step 21	21 s 3 to	2 ¹	1	9C) 20.99	20.89	20.54	20.18]	(87)

Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	20.05	20.05	20.06	20.08	20.08	20.11	20.11	20.11	20.1	20.08	20.07	20.07		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.98	0.94	0.85	0.69	0.51	0.33	0.22	0.25	0.43	0.75	0.95	0.99		(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=	19.03	19.4	19.74	20	20.07	20.1	20.11	20.11	20.09	19.98	19.51	18.99		(90)
			•				•	•	f	iLA = Livin	ng area ÷ (4) =	0.61	(91)
Mean	interna	l temper	ature (fc	or the wh	ole dwe	llina) = f	LA x T1	+ (1 – fL	_A) × T2					
(92)m=	19.75	20.05	20.34	20.56	20.63	20.65	20.65	20.65	20.64	20.54	20.13	19.71		(92)
Apply	adjustr	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.75	20.05	20.34	20.56	20.63	20.65	20.65	20.65	20.64	20.54	20.13	19.71		(93)
8. Spa	ace hea	ting req	uirement											
						ned at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calo	culate	
the ut	Jan	Feb	Mar	using Ta Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm		Iviay	Jun	Jui	_ Aug	0ep			Dec		
(94)m=	0.98	0.94	0.86	0.71	0.54	0.37	0.26	0.28	0.47	0 <mark>.77</mark>	0.95	0.98		(94)
	L Il gains,	hmGm	W = (9	1 4)m x (8 [,]	1 4)m				1		<u> </u>	L		
(95)m=	465.54	564.14	605.38	561.19	448.2	299.73	201.01	209.86	325.85	460.37	464.29	434.95		(95)
Mo <mark>nt</mark> ł	nly aver	age ex <mark>te</mark>	ernal terr	perature	e from Ta	able 8		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		(96)
	los <mark>s rate</mark>	e for me	an interr	· · ·		Lm , W =	=[(<mark>3</mark> 9)m	x [(93)m	– (96)m	-				
(97)m=	820.5	800.76	727.79	597.43	455.07	300.33	201.07	209.96	328.26	50 <mark>6.5</mark> 4	671.39	807.23		(97)
			1	1			1	1) <mark>m – (9</mark> 5 I		1	1		
(98)m=	264.09	159.01	91.07	26.09	5.11	0	0	0	0	34.35	149.11	276.97		
								Tota	al per year	(kWh/yea	r) = Sum(9	8)15,912 =	1005.81	(98)
Space	e heatin	g require	ement in	kWh/m ²	?/year								19.72	(99)
9b. En	ergy rec	quiremer	nts – Coi	mmunity	heating	scheme)							
•						•		•••	vided by		unity scł	neme.	-	(204)
						-	-		1) '0' if n	one			0	(301)
Fractio	on of spa	ace heat	from co	mmunity	' system	1 – (30′	1) =						1	(302)
	-									up to four	other heat	sources; t	he latter	
		• •	-	mal and wa ity boileı		rom powe	r stations.	See Appe	nuix C.				1	(303a)
				m Comn		oilers				(3	02) x (303	a) =	1	(304a)
		•			•		or comm	unitv hea	ating sys			,	1	(305)
				2c) for c					5-7-				1.05	(306)
	heatin		,	,		,	5,						kWh/ye	
•		-	requiren	nent									1005.81	
Space	heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	1056.1	(307a)
Efficier	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308

Space heating requirement from secondary/supplementary s	(98) x (301) x	: 100 ÷ (308) =	0	(309)
Space heating requirement norm secondary supplementary s		(000) =	0	
Water heating Annual water heating requirement			1502.43	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a)	x (305) x (306) =	1577.56	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	07e) + (310a)(310e)] =	26.34	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter	0) = (107) ÷ (314	4) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input fr	om outside		115.24	(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) =	115.24	(331)
Energy for lighting (calculated in Appendix L)			235.9	(332)
12b. CO2 Emissions – Community heating scheme				
	_			
CO2 from other sources of space and water heating (not CH	Energy kWh/year IP) using two fuels repeat (363) t	Emission factor kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	kWh/year	kg CO2/kWh	kg CO2/year](367a)](367)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	kWh/year IP) using two fuels repeat (363) t	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 =	kg CO2/year	(367) (372)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution Total CO2 associated with community systems	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373) (374)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x raneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.22 = 0.52 = 72) =	kg CO2/year	(367) (372) (373) (374) (375)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x raneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh xo (366) for the second fue 0.22 0.52 72) 0 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dw	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x aneous heater (312) x (373) + (374) + (375) = velling (331)) x	kg CO2/kWh 0 (366) for the second fue 0.22 0.52 72) 0 0.22 0 0.22 0 0.22 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP CO2 associated with heat source 1 [(30) Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instant Total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dw CO2 associated with electricity for lighting	kWh/year IP) using two fuels repeat (363) t 7b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(3 (309) x aneous heater (312) x (373) + (374) + (375) = velling (331)) x	kg CO2/kWh 0 (366) for the second fue 0.22 0.52 72) 0 0.22 0 0.22 0 0.22 0 0.22	kg CO2/year	(367) (372) (373) (374) (375) (376) (378) (379)

User Details:												
Assessor Name: Software Name:	Software Name: Stroma FSAP 2012 Software Version: Version											
Property Address: Flat 2-03												
Address :												
1. Overall dwelling dimer	ISIONS:	A	(···· 2)		A 11.)/ a lu una a (ma				
Ground floor		Ar	ea(m²)	(1a) x	Av. Hei	.08	(2a) =	Volume(m ³) (3a)			
	221.4	(3a)										
Total floor area $TFA = (1a)$)+(10)+(10)+(10)+(10)+	F(111)	72	(4) (32) (3b))+(3c)+(3d		(2n) =		– –			
Dwelling volume				(3a) + (3b))+(30)+(30	I) + (3e)+	.(31) =	221.4	(5)			
2. Ventilation rate:	main		othor		total			m ³ nor hou	-			
		ondary: ating	other		total			m ³ per hou	r			
Number of chimneys	0 +	0 +	0	=	0	X 4	40 =	0	(6a)			
Number of open flues	0 +	0 +	0	=	0	×	20 =	0	(6b)			
Number of intermittent fan	S				0	x ′	10 =	0	(7a)			
Number of passive vents				Γ	0	x ′	10 =	0	(7b)			
Number of flueless gas fire	es				0	X 4	40 =	0	(7c)			
Air changes per hour												
Infiltration due to chimney					0		÷ (5) =	0	(8)			
If a pressurisation test has be		, proceed to (17)	, otherwise d	continue fro	om (9) to ((16)	1					
Number of storeys in the Additional infiltration	e dweining (ns)					[(9)	-1]x0.1 =	0	(9) (10)			
Structural infiltration: 0.2	25 for steel or timber fra	ame or 0.35 f	or masonr	v constr	uction	[(0)	1100.1 -	0	(11)			
if both types of wall are pre	sent, use the value correspo			•				0				
deducting areas of opening If suspended wooden flo		d) or 0 1 (ooo	lad) alaa	ontor O								
If no draught lobby, enter		u) or 0.1 (Sea	ieu), eise	enter 0				0	(12)			
Percentage of windows		oped						0	(14)			
Window infiltration		opou	0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)			
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)			
Air permeability value, c	50, expressed in cubic	: metres per l	our per s	quare m	etre of e	nvelope	area	4	(17)			
If based on air permeabilit	y value, then (18) = [(17)	÷ 20]+(8), other	wise (18) = (16)				0.2	(18)			
Air permeability value applies	if a pressurisation test has b	een done or a o	egree air pe	rmeability	is being us	sed			_			
Number of sides sheltered			(20) 1	10 07E v (4	0)]			0	(19)			
Shelter factor			(20) = 1 -		9)] =			1	(20)			
Infiltration rate incorporation	-		(21) = (18)) x (20) =				0.2	(21)			
Infiltration rate modified fo				0		NL.	Du					
	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec					
Monthly average wind spe	- I I I		0.7		10	4.5	47					
(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					

Adjuste	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m			-	_	
.	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.2	0.22	0.22	0.24	j	
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se							(220)
				endix N, (2	3b) = (23a	a) x Fmv (e	equation (N	(15)), other	wise (23b) = (23a)			0.5	
			0 11	iency in %	, (, (,, ,	,) (200)			0.5	
			-	entilation	-					2b)m ⊥ (23b) v [[,]	1 _ (23c)	76.5 · 1001	5 (23c)
a) ii (24a)m=	r	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35	÷ 100]	(24a)
												0.00	i	()
(24b)m=				entilation				0	0 = (22)	0	230)	0	1	(24b)
	_		_	-				-	-	0	0	0	i	(210)
,				ntilation c then (24c	•	•				5 x (23h))			
(24c)m=	, <i>,</i>		0		0			0) = (220)	0		,, 0	0	I	(24c)
				l ole hous	-		-	-	-	Ů	Ů	Ů	i	(-)
,				m = (22k)	•					0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in box	(25)				1	
(25)m=	0.37	0.37	0.36	0.34	0.33	0.31	0.31	0.3	0.32	0.33	0.34	0.35		(25)
													1	
				paramete		Net An								
ELEN		Gros area		Openin m		Net Ar A ,n		U-valı W/m2		A X U (W/I	K)	k-value		A X k kJ/K
Doors						1.8	x	1.3	= [2.34	<i>,</i>			(26)
Windo	ws Type	e 1				5.27		/[1/(1.1)+	0.04] =	5.55	F			(27)
	ws Type					1.52		/[1/(1.1)+	<u> </u>	1.6	Ħ			(27)
	ws Type							/[1/(1.1)+	L		E.			
						9	=		L	9.48				(27)
	ws Type	; 4 				2.57	X ^{1/}	/[1/(1.1)+	0.04] =	2.71	╡,			(27)
Walls -		63.3	32	18.3	6	44.96	3 ×	0.15	= [6.74	_		_	(29)
Walls 7	Гуре2	4.73	3	1.8		2.93	X	0.17	=	0.49				(29)
Total a	rea of e	elements	, m²			68.05	5							(31)
				effective wi			ated using	formula 1,	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	
		ss, W/K :		nternal wali	is anu pan	uuons		(26)(30)	+ (32) =				00.0	(33)
		Cm = S(0)				()(00)		.(30) + (32	2) ± (325)	(320) -	28.9	
				⁻ = Cm ÷		k l/m2k				tive Value		(020) =	8747	
				tails of the				ocisoly the				ahla 1f	250) (35)
	0	ad of a de			00/101/201		i nilowii pr		maloutive	values of				
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						6.6	1 (36)
if details	of therma	al bridging	are not kr	nown (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			35.5	53 (37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)	•	1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(38)m=	27.22	26.85	26.48	24.66	24.29	22.47	22.47	22.1	23.2	24.29	25.02	25.75	l	(38)
Heat tr	ansfer o	coefficier	nt, W/K	_				_	(39)m	= (37) + (3	38)m		_	
(39)m=	62.74	62.38	62.01	60.19	59.82	57.99	57.99	57.63	58.72	59.82	60.55	61.28		
										Average =	Sum(39)1	12 /12=	60.0)9 (39)

Heat lo	ss para	meter (H	HLP), W/	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.87	0.87	0.86	0.84	0.83	0.81	0.81	0.8	0.82	0.83	0.84	0.85		
L			I (Tak					1	,	Average =	Sum(40)1	12 /12=	0.83	(40)
	Jan	Feb	nth (Tab 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)
(,	01	20			01					01		01		()
4. Wa	4. Water heating energy requirement: kWh/year:													
if TF	A > 13.9	upancy, I 9, N = 1 9, N = 1		:[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		29		(42)
Reduce	the annua	al average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve	+ 36 a water us	se target o		.68		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					I	
(44)m=	97.54	94	90.45	86.9	83.35	79.81	79.81	83.35	86.9	90.45	94	97.54		
Energy c	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600) kWh/mor		m(44) ₁₁₂ = ables 1b, 1		1064.1	(44)
(45)m=	144.65	126.51	130.55	113.82	109.21	94.24	87.33	100.21	101.41	118.18	129	140.09		_
lf instant	aneous w	ater heati	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1395.2	(45)
(46)m=	21.7	18.98	19.58	17.07	16.38	14.14	13.1	15.03	15.21	17.73	19.35	21.01		(46)
Water s		loss:												
-				-					a <mark>me ve</mark> s	sel		2		(47)
		•	and no ta		•			· ·		or (0' in ((17)			
Water s			not wate	er (unis ir	iciudes i	nstantar	leous co	ווסם ומחזכ	ers) ente	er U in (47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(48) x (49)) =			2		(50)
			eclared o	•										
		-	factor fr		e 2 (kW	h/litre/da	ay)				0.	03		(51)
		from Ta		011 4.5							3	91		(52)
			m Table	2b								.6		(52)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	0.	13		(54)
•••		(54) in (5	-									13		(55)
Water s	storage	loss cal	culated f	for each	month			((56)m = ((55) × (41)ı	m				
(56)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(56)
If cylinde	r contains	s 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	lix H	
(57)m=	4.07	3.67	4.07	3.93	4.07	3.93	4.07	4.07	3.93	4.07	3.93	4.07		(57)
Primary	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary	y circuit	loss cal	culated	for each	month (,	• •	65 × (41)					-	
, L	-	1	r	· · · · · ·	1	1	i	<u> </u>	a cylinde	1	, 	i	I	
(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 eac	h r	month (61)m =	(60	D) ÷ 36	65 × (41))m						_	
(61)m=	0	0	0		0	0		0	0	0	0		0	0	0		(61)
Total h	neat req	uired for	water l	hea	ating ca	alculated	d fo	or eacl	n month	(62)m	= 0.85	× (•	45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		(62)
Solar DI	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)																
(add a	dditiona	al lines if	FGHR	Sa	nd/or V	VWHRS	S ap	oplies,	, see Ap	pendi	(G)						
(63)m=	0	0	0		0	0		0	0	0	0		0	0	0		(63)
Output	t from w	vater hea	ter														
(64)m=	171.98	151.2	157.88		140.26	136.54	1	20.69	114.66	127.5	4 127.8	35	145.51	155.45	167.42		
		-								C	utput from	ו wa	ter heate	r (annual)₁	12	1716.97	(64)
Heat g	jains fro	m water	heating	g, k	(Wh/mo	onth 0.2	5 ′	[0.85	× (45)m	+ (61)m] + 0.	8 x	[(46)m	+ (57)m	+ (59)m]	
(65)m=	69.96	61.81	65.27	Τ	59	58.18	5	52.49	50.9	55.18	54.8	7	61.16	64.05	68.44		(65)
inclu	ude (57))m in calo	culation	l of	ⁱ (65)m	only if c	ylin	nder is	s in the c	dwellir	g or hot	t wa	ater is fi	rom com	munity h	leating	
5. In	ternal d	ains (see	e Table	5 a	and 5a):	-				-				-	_	
	Ŭ	ns (Table			,												
wictab	Jan	Feb	Mar		, Apr	May	Γ	Jun	Jul	Au	g Se	р	Oct	Nov	Dec		
(66)m=	114.68	114.68	114.68		114.68	114.68	1	14.68	114.68	114.6			114.68	114.68	114.68		(66)
Lightin		(calcula		_		equal	tion	190	(19a) a								
(67)m=	18	15.99	13	T	9.84	7.36	-	6.21	6.71	8.73		- 1	14.87	17.36	18.5		(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5																	
(68)m=	201.92	<u> </u>	198.73	_	187.49	173.3		59.97	151.06	148.9			165.48	179.67	193.01	1	(68)
· ·	L		<u> </u>	_			-						_	175.07	100.01		(00)
(69)m=	34.47	s (calcula 34.47	34.47	-	34.47	L, equa 34.47	-	34.47	34.47	, also 34.4			34.47	34.47	34.47	1	(69)
						54.47		04.47	34.47	54.4	54.4	1	34.47	34.47	34.47		(00)
-		ins gains	r`	58			-	-	-							1	(70)
(70)m=	0	0	0		0	0		0	0	0	0		0	0	0		(70)
	<u> </u>	vaporatic	<u> </u>	—		, ,	1	,						r		1	(
(71)m=	-91.75	-91.75	-91.75		-91.75	-91.75	-9	91.75	-91.75	-91.7	5 -91.7	'5	-91.75	-91.75	-91.75		(71)
Water		gains (T	able 5	_			_							,		1	
(72)m=	94.03	91.98	87.73		81.95	78.19	7	72.91	68.41	74.17	76.2	2	82.2	88.96	91.99		(72)
Total i	interna	l gains =	:				_	(66)	m + (67)m			+ (70)m + (7	'1)m + (72))m		
(73)m=	371.36	369.39	356.87		336.69	316.26	2	96.49	283.59	289.2	6 299.5	58	319.96	343.39	360.91		(73)
	lar gain																
		calculated	•	lar f		Table 6a	and		•	tions to	convert to	o the	e applicat		tion.		
Orient		Access F Table 6d			Area m²			Flu	x ole 6a		g_ Table 6	sh	т	FF able 6c		Gains (W)	
				-	111-			1 ai			Table	50	, , ,			(**)	-
	ast <mark>0.9x</mark>	0.77	:	×Ĺ	9		x	1	1.28	×	0.5		×	0.85	=	29.91	(75)
	ast <mark>0.9x</mark>	0.77		×	9		x	2	2.97	×	0.5		×	0.85	=	60.88	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	4	1.38	×	0.5		_ × [0.85	=	109.68	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	6	7.96	×	0.5		x	0.85	=	180.13	(75)
Northe	ast <mark>0.9x</mark>	0.77		× [9		x	9	1.35	×	0.5		x	0.85	=	242.13	(75)

Northeast 0.9x	0.77] x	9	×	97.38) ×	0.5	x	0.85	=	258.14	(75)
Northeast 0.9x	0.77] x	9	x	91.1	x	0.5	x	0.85	=	241.48	(75)
Northeast 0.9x	0.77) ×	9	x	72.63	l x	0.5	x	0.85	=	192.51	(75)
Northeast 0.9x	0.77	」 】 x	9	x	50.42	」 】 ×	0.5	x	0.85	=	133.65	(75)
Northeast 0.9x	0.77	」 】 x	9	x	28.07] x	0.5	x	0.85	=	74.4	(75)
Northeast 0.9x	0.77) x	9	x	14.2	x	0.5	x	0.85	=	37.63	(75)
Northeast 0.9x	0.77	x	9	x	9.21	x	0.5	x	0.85	=	24.42	(75)
Southwest _{0.9x}	0.77	x	5.27	x	36.79	ĺ	0.5	x	0.85	=	57.11	(79)
Southwest _{0.9x}	0.77	x	5.27	x	62.67	İ	0.5	x	0.85	=	97.28	(79)
Southwest0.9x	0.77	x	5.27	x	85.75	j	0.5	x	0.85	=	133.1	(79)
Southwest _{0.9x}	0.77	x	5.27	x	106.25]	0.5	x	0.85	=	164.92	(79)
Southwest _{0.9x}	0.77	x	5.27	x	119.01]	0.5	x	0.85	=	184.72	(79)
Southwest0.9x	0.77	x	5.27	x	118.15]	0.5	x	0.85	=	183.39	(79)
Southwest _{0.9x}	0.77	x	5.27	x	113.91]	0.5	x	0.85	=	176.8	(79)
Southwest _{0.9x}	0.77	x	5.27	x	104.39]	0.5	x	0.85	=	162.03	(79)
Southwest _{0.9x}	0.77	x	5.27	x	92.85]	0.5	x	0.85	=	144.12	(79)
Southwest _{0.9x}	0.77	x	5.27	x	69.27		0.5	x	0.85	=	107.51	(79)
Southwest0.9x	0.77	x	5.27	X	44.07		0.5	x	0.85	=	68.4	(79)
Southwest0.9x	0.77	x	5.27	х	31.49		0.5	x	0.85	=	48.87	(79)
Northwest 0.9x	0.77	x	1.52	x	11.28	×	0.5	x	0.85	=	5.05	(81)
Northwest 0.9x	0.77	x	2.57	x	11.28	×	0.5	×	0.85	=	8.54	(81)
Northwest 0.9x	0.77	x	1.52	×	22.97	х	0.5	x	0.85	=	10.28	(81)
Northwest 0.9x	0.77	x	2.57	x	22.97	×	0.5	×	0.85	=	17.38	(81)
Northwest 0.9x	0.77	x	1.52	x	41.38	×	0.5	x	0.85	=	18.52	(81)
Northwest 0.9x	0.77	x	2.57	x	41.38	×	0.5	x	0.85	=	31.32	(81)
Northwest 0.9x	0.77	×	1.52	x	67.96	×	0.5	x	0.85	=	30.42	(81)
Northwest 0.9x	0.77	x	2.57	x	67.96	×	0.5	x	0.85	=	51.44	(81)
Northwest 0.9x	0.77	x	1.52	x	91.35	×	0.5	x	0.85	=	40.89	(81)
Northwest 0.9x	0.77	X	2.57	x	91.35	×	0.5	x	0.85	=	69.14	(81)
Northwest 0.9x	0.77	X	1.52	X	97.38	X	0.5	x	0.85	=	43.6	(81)
Northwest 0.9x	0.77	×	2.57	x	97.38	X	0.5	x	0.85	=	73.71	(81)
Northwest 0.9x	0.77	X	1.52	X	91.1	X	0.5	x	0.85	=	40.78	(81)
Northwest 0.9x	0.77	×	2.57	X	91.1	X	0.5	x	0.85	=	68.96	(81)
Northwest 0.9x	0.77	X	1.52	x	72.63	X	0.5	x	0.85	=	32.51	(81)
Northwest 0.9x	0.77	×	2.57	X	72.63	X	0.5	x	0.85	=	54.97	(81)
Northwest 0.9x	0.77	X	1.52	×	50.42	X	0.5	x	0.85	=	22.57	(81)
Northwest 0.9x	0.77	X X	2.57	X	50.42	X V	0.5	x	0.85	=	38.16	(81)
Northwest 0.9x	0.77) × 1 v	1.52	X	28.07	X V	0.5	x	0.85	=	12.57	(81)
Northwest 0.9x	0.77	X V	2.57	x	28.07	X V	0.5	x	0.85	=	21.24	(81)
Northwest 0.9x	0.77	∫ X] v	1.52	x	14.2	× ~	0.5	x	0.85	=	6.36	(81)
North West 0.9X	0.77	×	2.57	x	14.2	×	0.5	x	0.85	=	10.75	(81)

Northwest 0.9x 0.77	×	1.5	2	x	9.21) x [0.5	_ × [0.85	=	4.13	(81)
Northwest 0.9x 0.77	×	2.5	7	x	9.21	i x [0.5		0.85		6.97	(81)
						J L						
Solar gains in watts, c	alculated	for each	n month			(83)m = 3	Sum(74)m .	(82)m				
(83)m= 100.61 185.82	292.63	426.91	536.89	558.84	528.03	442.03	338.51	215.72	123.14	84.4		(83)
Total gains – internal	and solar	(84)m =	(73)m -	+ (83)m	, watts		1					
(84)m= 471.97 555.21	649.5	763.6	853.15	855.33	811.62	731.29	638.08	535.68	466.53	445.31		(84)
7. Mean internal tem	perature	(heating	season)	•	•	•					
Temperature during					from Tab	ole 9, Ti	n1 (°C)				21	(85)
Utilisation factor for g	• •			-								
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1 0.99	0.96	0.85	0.64	0.43	0.31	0.36	0.62	0.92	0.99	1		(86)
Mean internal tempe	rature in	living are	a T1 (fc		$\frac{1}{2}$	I 7 in Tab						
(87)m= 20.21 20.37	20.62	20.89	20.98	21	21	21	20.99	20.82	20.48	20.19		(87)
	ļ											
Temperature during(88)m=20.1920.2	20.2	20.22	20.23	aweiling 20.25	20.25	20.25	20.24	20.23	20.22	20.21		(88)
							20.24	20.23	20.22	20.21		(00)
Utilisation factor for g			-		1							(0.0)
(89)m= 1 0.99	0.95	0.81	0.59	0.38	0.26	0.3	0.56	0.9	0.99	1		(89)
Me <mark>an int</mark> ernal tempe	rature in	t <mark>he r</mark> est o	of dwelli	ng T2 (f	follow ste	eps 3 to	7 in Tabl	e 9 <mark>c)</mark>				
(90)m= 19.13 19.38	19.73	20.1	20.21	<mark>2</mark> 0.25	20.25	20.25	20.23	2 <mark>0.03</mark>	19.54	19.12		(90)
								fLA = Livin	g area ÷ (4	4) =	0.52	(91)
Mean internal tempe	rature (fo	r the who	ole dwe	lling) = f	$LA \times T1$	+ (1 – f	LA) × T2					
(92)m= 19.69 19.89	20.19	20.51	20.61	20.64	20.64	20.64	20.62	20.44	20.03	19.68		(92)
Apply adjustment to	he mean	internal	temper	ature fro	m Table	4e, wh	ere appro	opriate				
(93)m= 19.69 19.89	20.19	20.51	20.61	20.64	20.64	20.64	20.62	20.44	20.03	19.68		(93)
8. Space heating req	uirement											
Set Ti to the mean in		•		ed at st	ep 11 of	Table 9)b, so tha	ıt Ti,m=(76)m an	d re-calo	culate	
the utilisation factor f	1 ⁻			l	1 1.1	A	0.00	0.4	Nau	Dee	l	
Jan Feb Utilisation factor for g	Mar Nar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m= 0.99 0.98	0.95	0.83	0.61	0.41	0.29	0.33	0.59	0.91	0.99	1		(94)
Useful gains, hmGm				0.11	0.20	0.00	0.00	0.01	0.00			(-)
(95)m= 469.32 546.78	617.4	630.57	523.74	349.61	234.13	244.24	377.98	484.9	459.88	443.48		(95)
Monthly average extended	ernal tem	l perature										
(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	rature,	Lm , W	- =[(39)m	x [(93)n	n– (96)m]				
(97)m= 965.48 935.27	849.15	698.58	533.1	350.11	234.17	244.33	383.17	588.79	782.65	948.48		(97)
Space heating requir	ement fo	r each m	onth, k	Nh/mor	th = 0.02	24 x [(97	7)m – (95)m] x (4	1)m			
(98)m= 369.14 261.07	172.42	48.97	6.96	0	0	0	0	77.29	232.39	375.72		
						Tot	al per year	(kWh/yea	r) = Sum(9	8)15,912 =	1543.96	(98)
Space heating requir	ement in	kWh/m²/	/year								21.44	(99)

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 he	ating (Table ⁻	1) '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 pro- includes boilers, heat pumps, geothermal and waste heat from power s	ocedure allows fo	•	our other heat sour	rces; the		_
Fraction of heat from Community boilers					1	(303a)
Fraction of total space heat from Community boilers			(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for a	community he	ating system			1	(305)
Distribution loss factor (Table 12c) for community heating	system				1.05	(306)
Space heating Annual space heating requirement					kWh/year 1543.96]
Space heat from Community boilers		(98) x (304a) x ((305) x (306) =		1621.16	(307a)
Efficiency of secondary/supplementary heating system in	% (from Tab	e 4a or Appen	dix E)		0	(308
Space heating requirement from secondary/supplementa	ry system	(98) x (301) x 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement				Γ	1716.97]
If DHW from community scheme: Wat <mark>er heat from Community boilers</mark>		(64) x (303a) x ((305) x (306) =		1802.82	(310a)
Electricity used for heat distribution	0.0	1 × [(307a)(307e	e) + <mark>(310a)(310e</mark>	e)] =	34.24	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling system, if not en	ter 0)	= (107) ÷ (314)	=		0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input	it from outside	9		Γ	204.2	(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) =		204.2	(331)
Energy for lighting (calculated in Appendix L)					317.91	(332)
12b. CO2 Emissions – Community heating scheme						
		ergy Vh/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heating (not Efficiency of heat source 1 (%)		ls repeat (363) to ((366) for the secor	nd fuel	92	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] >	100 ÷ (367b) x	0.22	=	803.89	(367)
Electrical energy for heat distribution	[(313) x		0.52	=	17.77	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	=	821.66	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or inst	antaneous he	ater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		-	821.66	(376)
CO2 associated with electricity for pumps and fans within	dwelling (33	1)) x	0.52	=	105.98	(378)

CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	164.99	(379)
Total CO2, kg/year	sum of (376)(382) =				1092.64	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.18	(384)
El rating (section 14)					87.49	(385)
						-

