

295-297 HIGH HOLBORN

ENERGY STATEMENT ADDENDUM

1 BACKGROUND

This document forms an addendum to the Energy Statement R02 dated March 2017 prepared by Scotch Partners. It should be read in conjunction with the Energy Statement R02 and all other documents forming part of the planning application

The energy strategy has been updated in line with changes to the building services strategy for the proposed development. Following discussions with UK Power Networks it has been agreed that a substation would not be required as part of the development. Therefore the available power supply for the development is reduced. As such the reliance on electrical supply to meet the heating and hot water demand via air sourced heat pumps (ASHP) is no longer possible. Instead, it is proposed to use a mix of electric ASHP, gas boilers and gas driven ASHP.

The following sections describe the revisions to the energy strategy and provides a summary of the overall CO₂ emissions reduction predicted for the proposed development, the updated carbon offset payment and portion of the developments energy provided by renewable energy.

2 REVISED STRATEGY

The energy strategy for the proposed development continues to follow the same energy hierarchy as the Energy Statement and has been developed in line with Camden Council Policy. At each stage of the hierarchy the proposed development's CO₂ emissions have been evaluated and the percentage reduction achieved reported.

Regulated energy use and the associated CO_2 emissions have been calculated using Part L energy assessment software Stroma FSAP 2012 v1.0.4.7 for the domestic elements, and DesignBuilder 5.0.3.007 SBEM engine version 5.2.g.3 for the non-domestic elements.

All total development CO₂ emissions reported are based on the outputs from the SBEM BRUKL reports and SAP worksheets using the Building Emissions Rate (BER), Dwelling Emissions Rate (DER) and Target Emission Rate (TER). Where the TER from the 'Be Lean' scenario is used to represent the energy use of the Building Regulations Part L compliant development baseline, hereafter referred to as the 'notional development'. Total development figures are then calculated as an area weighted average.

Unregulated emissions for the domestic units have been estimated using the BREDEM 2012 Domestic Energy Model Version 1.0 calculations for 'Appliance' and 'Cooking' energy consumption. Notional unregulated emissions for the non-domestic elements have been taken from the SBEM BRUKL report as the 'equipment' load.

2.1 "BE LEAN" – REDUCE ENERGY DEMAND

No changes have been made to the "Be Lean" strategy, lean measures are therefore as per the Energy Statement R02.

Through the application of the "Be Lean" measures, a CO_2 emissions reduction of 13.4% could be achieved over the notional development baseline.

2.2 "BE CLEAN" – SUPPLY ENERGY EFFICIENTLY

No changes have been made to the "Be Clean" strategy, clean measures are therefore as per the Energy Statement R02.

2.3 "BE GREEN" – USE RENEWABLE ENERGY

No changes have been made to the number of PV (photovoltaic) panels and the cooling strategy for the domestic and non-domestic elements.

The space heating strategy for the non-domestic elements has been changed from being entirely served by electric ASHP to a mix of gas boilers and electric ASHP.

The space heating and hot water strategy for the domestic elements have also been changed. Previously the domestic elements were entirely served by individual electric ASHP. The proposed strategy uses a community heating and hot water system fed by a gas driven ASHP.

The SCOP (seasonal coefficient of performance) of the gas driven ASHP and all other building services inputs are given in Appendix 1.

2.3.1 BREAKDOWN OF DOMESTIC AND NON-DOMESTIC EMISSIONS SAVINGS

Table 2.1 lists the domestic and non-domestic CO_2 emission reductions after each stage of the energy hierarchy following the changes in heating and hot water systems described above. Through measures applied the domestic elements achieves a 32.5% reduction in CO_2 and the non-domestic elements show 35.1% reduction over the notional development baseline.

	Domestic		Non-Domestic	
	CO ₂ Emissions (tCO ₂ /annum)	Percentage CO ₂ Emissions Savings	CO ₂ Emissions (tCO ₂ /annum)	Percentage CO ₂ Emissions Savings
Building Regulations 2013 Part L Compliant Development	17.031		25.976	
Savings from "Be Lean"	0.308	1.8%	5.474	21.1%
Savings from "Be Clean"	0.000	0.0%	0.000	0.0%
Savings from "Be Green"	5.230	30.7%	3.650	14.0%
Cumulative Savings	5.537	32.5%	9.124	35.1%

Table 2.1 - Domestic and Non-Domestic Regulated CO2 Emissions and Savings

2.3.2 TOTAL DEVELOPMENT EMISSIONS SAVINGS AND OFF-SET PAYMENT

Table 2.2 lists the development's total regulated CO_2 emissions and CO_2 savings, and Table 2.3 gives the updated off-set payment. The development achieves a 34.1% reduction in CO_2 over the notional development baseline. The development's total regulated CO_2 emissions have reduced from $51tCO_2$ as per the Energy Statement R02 to $43tCO_2$. The estimated CO_2 offset payment has reduced from £27,756 to £20,688.

Table 2.2 - Development Total Regulated CO₂ Emissions, Savings

	Total regulated emissions (tCO2/annum)	CO2 savings (tCO2/annum)	Percentage Savings
Part L 2013 Compliant Baseline	43.007		
After "Be Lean"	37.225	5.782	13.4%
After "Be Clean"	37.225	0.000	0.0%
After "Be Green"	28.346	8.879	20.6%
Cumulative Development Savings		14.661	34.1%

Table 2.3 - Development Off-set Payment

30 Year Cumulative Savings from Offset	344.799 tCO ₂	
Offset Payment	£20,688	* Based on £60/tCO₂ as per "GLA Guidance on Preparing Energy Statements" March 2016

3 CONCLUSION

Scotch Partners have prepared this Energy Statement Addendum for the proposed development at 295-297 High Holborn to identify the impact of changes to the building services strategy proposed. The energy strategy for the proposed development continues to follow the same energy hierarchy as the Energy Statement in line with Camden Council Policy.

The building services strategy has been changed in line with there no longer being a requirement for a substation. This has reduced the available on-site electrical supply. Reliance on electrically driven ASHP has therefore been reduced by using gas fired condensing boilers and gas driven ASHP to meet some of the heat demand.

Through a range of "Be Lean", "Be Clean" and "Be Green" measures the Development achieves an overall 34.1% reduction in CO₂ over a Building Regulations Part L 2013 compliant development. It has been estimated that the proposed development could produce 5.5% of its regulated energy use through PV power generation.

APPENDIX 1 – SBEM & SAP MODEL INPUTS

FABRIC PERFORMANCE

	Non-Domestic	Domestic
Air Permeability	3m ³ /hm ² @50Pa	3m ³ /hm ² @50Pa
Roof U-value	0.13W/m ² K	0.12W/m ² K
Floor over commercial U-value		0.065W/m ² K
Basement Floor U-value	0.13W/m²K	-
External Wall U-value	0.18W/m ² K	0.18W/m²K
Basement Wall U-value	Adiabatic	-
Window U-value	1.4 W/m ² K	1.4 W/m ² K
Frame Fraction/Factor	0.11	1
G-value T Solar	0.28	0.63
L Solar	0.71	-

LIGHTING

	Office	Toilet/Stairs/Stores	Retail	Plant Room
Lamp & Ballast Efficacy	LED 100lm/W	LED 100lm/W	LED 100lm/W	LED 100lm/W
Light Output Ratio	1	1	1	1
Photoelectric Control	Dimming Addressable	-	-	-
Occupancy Sensing	Auto-on-off	Auto-on-off	-	-
Display Lighting	-	-	LED 100lm/W	-

VENTILATION

	Office	Retail	Domestic
	Mechanical	Mechanical	
Main Areas	SFP – 1.06	SFP – 1.37	
	Thermal Wheel 0.714	Thermal Wheel 0.714	MVHR
T 1 1 (c) (D)	Local mechanical extract		Nuaire MRXBOX
Toilet/Store/Plant	SFP – 0.4		

HEATING & COOLING

	Non-Domestic	Domestic
Office and Retail	Split VRF Electric ASHP SCOP – 4.65 SEER – 4.39 EER – 3.91	Community Heating Scheme Gas ASHP Community Boiler SCOP – 1.32
Toilet/Store/Stairs/Plant	Gas LTHW Boiler SCOP – 0.95	Daikin VRV EER – 3.53

DOMESTIC HOT WATER

	Non-Domestic	Domestic
DHW Throughout	Instant Electric	From main heating system

RENEWABLE ENERGY

	Non-Domestic	Domestic
PV on roof	10 No. 0.32kWp panels	10 No. 0.32kWp panels

APPENDIX 2 – DATA SOURCES

MODEL GEOMETRY INPUTS

	Comment
Architect	Independent Architects
SBEM Site Location	London

MODEL HVAC INPUTS

	Comment
M&E Consultant	Scotch Partners LLP

REFERENCE DOCUMENTATION

	Comment
Local Planning Policy	CPG 3 Planning Guidance on Sustainability
Building Regulations	Approved Document L2A
Building Regulations	Approved Document L1A

As designed

Compliance with England Building Regulations Part L 2013

Project name

295 High Holborn

Date: Tue Aug 08 12:31:57 2017

Administrative information

Building Details

Certification tool

Calculation engine: SBEM Calculation engine version: v5.3.a.0 Interface to calculation engine: DesignBuilder SBEM Interface to calculation engine version: v5.0.3 BRUKL compliance check version: v5.3.a.0

Owner Details Name: Telephone number: Address: , ,

Certifier details Name: Telephone number: Address: , ,

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24.2
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24.2
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	19.1
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	3. 1st Offices - Toilet_W_10
Floor	0.25	0.13	0.13	1 - Basement - Refuse_S_3
Roof	0.25	0.13	0.13	3. 1st Offices - Toilet_R_4
Windows***, roof windows, and rooflights	2.2	1.4	1.4	2- Ground - Entryway_G_8
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Ua-Limit = Limiting area-weighted average U-values [W	//(m²K)]			

 U_{a-Calc} = Calculated area-weighted average U-values [W/(III K)]

 $U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]$

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building		
m³/(h.m²) at 50 Pa	10	3		

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values			
Whole building electric power factor achieved by power factor correction	>0.95		

1- Gas Boiler htg

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency		
This system	0.91	-	-	-	-		
Standard value	0.91*	N/A	N/A	N/A	N/A		
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES							
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.							

2- Split System htg & clg

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency				
This system	0.91	3.91	-	-	-				
Standard value	0.91*	2.6	N/A	N/A	N/A				
Automatic moni	Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES								

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- Project DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
А	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
Ι	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(I/s)]							UD officiency			
ID of system type	Α	В	С	D	E	F	G	Н	Ι	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
3. 1st Offices - Stairs Lift	-	-	-	-	-	-	-	-	-	-	N/A
3. 1st Offices - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
4. 2nd Offices - Stairs Lift	-	-	-	-	-	-	-	-	-	-	N/A
4. 2nd Offices - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
2- Ground - Entryway	-	-	-	-	-	-	-	-	-	-	N/A
2- Ground - Lift Stair Corridor	-	-	-	-	-	-	-	-	-	-	N/A
1 - Basement - Refuse	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Corridor	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]								UD officionov		
ID of system type	Α	В	С	D	Е	F	G	Н	I	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
1 - Basement - Cycle Store	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Cycle Shower	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Stair Lift	-	-	-	-	-	-	-	-	-	-	N/A
1 - Basement - Retail Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Plant Room	-	-	0.4	-	-	-	-	-	-	-	N/A
3. 1st Offices - Office	-	-	-	1.1	-	-	-	-	-	0.71	0.65
4. 2nd Offices - Office	-	-	-	1.1	-	-	-	-	-	0.71	0.65
2- Ground - Retail	-	-	-	1.4	-	-	-	-	-	0.71	0.65
1 - Basement - Retail	-	-	-	1.4	-	-	-	-	-	0.71	0.65

General lighting and display lighting	Lumino	ous effic]	
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3. 1st Offices - Stairs Lift	-	100	-	71
3. 1st Offices - Toilet	-	100	-	56
4. 2nd Offices - Stairs Lift	-	100	-	70
4. 2nd Offices - Toilet	-	100	-	55
2- Ground - Entryway	-	100	60	163
2- Ground - Lift Stair Corridor	-	100	-	84
1 - Basement - Refuse	100	-	-	13
1 - Basement - Corridor	-	100	-	39
1 - Basement - Cycle Store	100	-	-	28
1 - Basement - Cycle Shower	-	100	-	34
1 - Basement - Stair Lift	-	100	-	68
1 - Basement - Retail Toilet	-	100	60	62
1 - Basement - Plant Room	100	-	-	263
3. 1st Offices - Office	100	-	-	1257
4. 2nd Offices - Office	100	-	-	1253
2- Ground - Retail	-	100	60	1776
1 - Basement - Retail	-	100	60	879

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
2- Ground - Entryway	NO (-47.1%)	NO
1 - Basement - Retail Toilet	N/A	N/A
3. 1st Offices - Office	NO (-49.4%)	NO
4. 2nd Offices - Office	NO (-47.7%)	NO
2- Ground - Retail	NO (-0%)	NO
1 - Basement - Retail	NO (-17%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?			
Is evidence of such assessment available as a separate submission?	NO		
Are any such measures included in the proposed design?	NO		

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional	%
Area [m ²]	1071.6	1071.6	39
External area [m ²]	652.1	652.1	
Weather	LON	LON	61
Infiltration [m ³ /hm ² @ 50Pa]	3	3	
Average conductance [W/K]	341.89	341.94	
Average U-value [W/m ² K]	0.52	0.52	
Alpha value* [%]	150.89	15.67	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services
A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
B1 Offices and Workshop businesses
B2 to B7 General Industrial and Special Industrial Groups
B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
C2 Residential Institutions: Universities and colleges
C2A Secure Residential Institutions
Residential spaces
D1 Non-residential Institutions: Community/Day Centre
D1 Non-residential Institutions: Libraries, Museums, and Galleries
D1 Non-residential Institutions: Education
D1 Non-residential Institutions: Primary Health Care Building
D1 Non-residential Institutions: Crown and County Courts
D2 General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger terminals
Others: Emergency services
Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs

Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	23.03	4.9
Cooling	4.76	10.05
Auxiliary	4.79	3.7
Lighting	16.87	30.8
Hot water	1.56	1.81
Equipment*	44.67	44.67
TOTAL**	51.01	51.26

* Energy used by equipment does not count towards the total for calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	135.11	156.59
Primary energy* [kWh/m ²]	111.85	141.31
Total emissions [kg/m ²]	19.1	24.2

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

H	HVAC Systems Performance									
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2		Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST	[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
	Actual	39.2	15.3	12.7	0	4.2	0.86	0	0.91	0
	Notional	31.3	33.6	10.6	0	4.7	0.82	0		
[ST	[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
	Actual	92.3	87.2	28.7	7.4	5.1	0.89	3.28	0.91	4.39
	Notional	5.2	201.9	1.8	15.6	3.1	0.82	3.6		

Key to terms

•	
Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*
Wall	0.23	0.18	3. 1st Offices - Toilet_W_10
Floor	0.2	0.13	1 - Basement - Refuse_S_3
Roof	0.15	0.13	3. 1st Offices - Toilet_R_4
Windows, roof windows, and rooflights	1.5	1.4	2- Ground - Entryway_G_8
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m ² K)]		U _{i-Min} = Minimum individual element U-values [W/(m ² K)]
* There might be more than one surface where the n	ninimum U	-value oco	curs.

Air Permeability	Typical value This building	
m³/(h.m²) at 50 Pa	5	3

As designed

Compliance with England Building Regulations Part L 2013

Project name

295 High Holborn

Date: Wed Aug 09 15:29:11 2017

Administrative information

Building Details

Certification tool

Calculation engine: SBEM Calculation engine version: v5.3.a.0 Interface to calculation engine: DesignBuilder SBEM Interface to calculation engine version: v5.0.3 BRUKL compliance check version: v5.3.a.0

Owner Details Name: Telephone number: Address: , ,

Certifier details Name: Telephone number: Address: , ,

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24.2
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24.2
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.7
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U a-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	3. 1st Offices - Toilet_W_10
Floor	0.25	0.13	0.13	1 - Basement - Refuse_S_3
Roof	0.25	0.13	0.13	3. 1st Offices - Toilet_R_4
Windows***, roof windows, and rooflights	2.2	1.4	1.4	2- Ground - Entryway_G_8
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Ua-Limit = Limiting area-weighted average U-values [W	//(m²K)]			

 U_{a-Calc} = Calculated area-weighted average U-values [W/(mrK)]

 $U_{i-Calc} = C$ alculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	3

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO	
Whole building electric power factor achieved by power factor correction	>0.95	

1- Gas Boiler htg

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency		
This system	0.95	-	-	-	-		
Standard value	0.91*	N/A	N/A	N/A	N/A		
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES							
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.							

2- Split System htg & clg

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency			
This system	4.65	3.91	-	-	-			
Standard value	2.5*	2.6	N/A	N/A	N/A			
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES								

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- Project DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]					HP officionay				
ID of system type	Α	В	С	D	Е	F	G	Н	I	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
3. 1st Offices - Stairs Lift	-	-	-	-	-	-	-	-	-	-	N/A
3. 1st Offices - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
4. 2nd Offices - Stairs Lift	-	-	-	-	-	-	-	-	-	-	N/A
4. 2nd Offices - Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A
2- Ground - Entryway	-	-	-	-	-	-	-	-	-	-	N/A
2- Ground - Lift Stair Corridor	-	-	-	-	-	-	-	-	-	-	N/A
1 - Basement - Refuse	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Corridor	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name		SFP [W/(I/s)]									
ID of system type	Α	В	С	D	Е	F	G	Н	I	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
1 - Basement - Cycle Store	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Cycle Shower	-	-	0.4	-	-	-	-	-	-	-	N/A
1 - Basement - Stair Lift	-	-	-	-	-	-	-	-	-	-	N/A
1 - Basement - Plant Room	-	-	0.4	-	-	-	-	-	-	-	N/A
3. 1st Offices - Office	-	-	-	1.1	-	-	-	-	-	0.71	0.65
4. 2nd Offices - Office	-	-	-	1.1	-	-	-	-	-	0.71	0.65
2- Ground - Retail	-	-	-	1.4	-	-	-	-	-	0.71	0.65
2- Ground - Riser	-	-	-	-	-	-	-	-	-	-	N/A
1 - Basement - Retail	-	-	-	1.4	-	-	-	-	-	0.71	0.65
1 - Basement - Retail Toilet	-	-	0.4	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Lumino	ous effic	acy [lm/W]]
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
3. 1st Offices - Stairs Lift	-	100	-	71
3. 1st Offices - Toilet	-	100	-	56
4. 2nd Offices - Stairs Lift	-	100	-	70
4. 2nd Offices - Toilet	-	100	-	55
2- Ground - Entryway	-	100	60	163
2- Ground - Lift Stair Corridor	-	100	-	84
1 - Basement - Refuse	100	-	-	13
1 - Basement - Corridor	-	100	-	39
1 - Basement - Cycle Store	100	-	-	28
1 - Basement - Cycle Shower	-	100	-	34
1 - Basement - Stair Lift	-	100	-	68
1 - Basement - Plant Room	100	-	-	263
3. 1st Offices - Office	100	-	-	1257
4. 2nd Offices - Office	100	-	-	1253
2- Ground - Retail	-	100	60	1776
2- Ground - Riser	100	-	-	4
1 - Basement - Retail	-	100	60	879
1 - Basement - Retail Toilet	-	100	60	62

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
2- Ground - Entryway	NO (-47.1%)	NO
3. 1st Offices - Office	NO (-49.4%)	NO
4. 2nd Offices - Office	NO (-47.7%)	NO
2- Ground - Retail	NO (-0%)	NO
2- Ground - Riser	N/A	N/A
1 - Basement - Retail	NO (-17%)	NO
1 - Basement - Retail Toilet	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional	%
Area [m ²]	1073.4	1073.4	39
External area [m ²]	657.2	657.2	
Weather	LON	LON	61
Infiltration [m ³ /hm ² @ 50Pa]	3	3	
Average conductance [W/K]	342.81	343.27	
Average U-value [W/m ² K]	0.52	0.52	
Alpha value* [%]	150.53	15.64	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services
A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
B1 Offices and Workshop businesses
B2 to B7 General Industrial and Special Industrial Groups
B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
C2 Residential Institutions: Universities and colleges
C2A Secure Residential Institutions
Residential spaces
D1 Non-residential Institutions: Community/Day Centre
D1 Non-residential Institutions: Libraries, Museums, and Galleries
D1 Non-residential Institutions: Education
D1 Non-residential Institutions: Primary Health Care Building
D1 Non-residential Institutions: Crown and County Courts
D2 General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger terminals
Others: Emergency services
Others: Miscellaneous 24hr activities
Otherse Oran Dealer Others

Others: Car Parks 24 hrs

Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.96	4.17
Cooling	4.81	10.13
Auxiliary	4.77	3.69
Lighting	16.85	30.77
Hot water	1.56	1.81
Equipment*	44.6	44.6
TOTAL**	35.96	50.56

* Energy used by equipment does not count towards the total for calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	2.34	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	135.17	156.61
Primary energy* [kWh/m ²]	99.96	141.25
Total emissions [kg/m ²]	15.7	24.2

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

F	HVAC Systems Performance											
System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER		
[ST	[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity											
	Actual	39.4	13.5	12.3	0	4.2	0.89	0	0.95	0		
	Notional	31.4	30.3	10.7	0	4.6	0.82	0				
[ST] Split or m	ulti-split sy	stem, [HS]	Heat pump	(electric): a	ir source, [HFT] Electr	icity, [CFT]	Electricity			
	Actual	92.1	87.8	5.6	7.4	5.1	4.56	3.28	4.65	4.39		
	Notional	5.6	202.6	0.6	15.6	3.2	2.43	3.6				

Key to terms

•	
Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*
Wall	0.23	0.18	3. 1st Offices - Toilet_W_10
Floor	0.2	0.13	1 - Basement - Refuse_S_3
Roof	0.15	0.13	3. 1st Offices - Toilet_R_4
Windows, roof windows, and rooflights	1.5	1.4	2- Ground - Entryway_G_8
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m ² K)]		U _{i-Min} = Minimum individual element U-values [W/(m ² K)]
* There might be more than one surface where the n	ninimum U	-value oco	curs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

		Use	r Details:									
Assessor Name: Software Name:	Stroma FSAP 207		Strom Softwa	are Ver			Versio	n: 1.0.4.7				
Property Address: 5 Address :												
1. Overall dwelling dim	ensions:											
		Δ	rea(m²)		Av. Hei	aht(m)		Volume(m ³)				
Ground floor				(1a) x		85	(2a) =	275.88	(3a)			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	e)+(1n)	96.8	(4)] [_			
Dwelling volume		, , , _	00.0)+(3c)+(3d))+(3e)+	.(3n) =	275.88	(5)			
								210.00				
2. Ventilation rate:	main s	econdary	other		total			m ³ per hour				
Number of chimneys	heating	heating		7 = Г			40 =	-	-			
		0	0	- <u>-</u>	0		l	0	(6a)			
Number of open flues	0 +	0 +	0	」⁼∟	0		20 =	0	(6b)			
Number of intermittent fa	ans				3	x ?	10 =	30	(7a)			
Number of passive vent	S				0	x ′	10 =	0	(7b)			
Number of flueless gas	fires				0	X 4	40 =	0	(7c)			
							Air ch	anges per ho	ur			
Infiltration due to chimne					30		÷ (5) =	0.11	(8)			
	been carried out or is intend	led, proceed to (1	7), otherwise (continue fr	om (9) to (16)						
Number of storeys in Additional infiltration	the dweiling (ns)					[(9).	-1]x0.1 =	0	(9) (10)			
	0.25 for steel or timber	frame or 0.35	for mason	v constr	uction	[(0)	1,00.1 -	0	(10)			
if both types of wall are	present, use the value corres			•			I	0				
deducting areas of open If suspended wooden	floor, enter 0.2 (unsea	iled) or 0.1 (se	aled) else	enter 0				0	(12)			
·	nter 0.05, else enter 0		alou), oloo	ontor o				0	(12)			
0 1	vs and doors draught s	tripped						0	(14)			
Window infiltration	Ū		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)			
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) +	- (15) =		0	(16)			
Air permeability value	, q50, expressed in cul	bic metres per	hour per s	quare m	etre of e	nvelope	area	5	(17)			
If based on air permeab	ility value, then (18) = [(?	17) ÷ 20]+(8), othe	erwise (18) = ((16)				0.36	(18)			
	ies if a pressurisation test ha	is been done or a	degree air pe	rmeability	is being us	sed			٦			
Number of sides shelter Shelter factor	ed		(20) = 1 -	[0.075 x (1	9)] =			2	(19) (20)			
Infiltration rate incorpora	ating shelter factor		(21) = (18		-71		l	0.85	(20)			
Infiltration rate modified	-	d		/ (-/			l	0.5				
Jan Feb	Mar Apr May	Jun Ju	I Aug	Sep	Oct	Nov	Dec					
Monthly average wind s	1 · 1 ·	11										
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7					
Wind Factor (22a)m = (2	22 m ± 4	· · ·										
(22a)m = 1.27 1.25	1.23 1.1 1.08	0.95 0.9	5 0.92	1	1.08	1.12	1.18					
		I I										

Adjuste	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	_		_	
	0.39	0.38	0.37	0.34	0.33	0.29	0.29	0.28	0.3	0.33	0.34	0.36		
	<i>ate effec</i> echanica		•	rate for t	he appli	cable ca	se							(23a)
				endix N (2	3b) = (23a	a) x Fmv (e	equation (N	N5)) , other	wise (23h) = (23a)			0	
								n Table 4h)) (200)			0	(23b)
					U		,	HR) (24a		2h)m ⊥ (23b) v [1 _ (23c)	0	(23c)
(24a)m=				0				0	0 $11 = (22)$	$\frac{2}{0}$		$\frac{1-(230)}{0}$	- 100j	(24a)
		÷	-	Ţ	Ŧ	÷	÷	 ۸V) (24b	÷	÷	Ů	Ů	l	()
(24b)m=				0				0	0 = (22)		230)	0	1	(24b)
	_			_				n from c	-	Ů	Ů	0	l	()
,					•	•		c) = (22b		5 x (23b))			
(24c)m=	<u> </u>	0	0	0	0	0	0	0	0	0	0	0		(24c)
		ventilatio	on or wh	ole hous	e positiv	l /e input :	ı ventilatio	n from l	oft				I	
,					•			0.5 + [(2		0.5]				
(24d)m=	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in box	(25)					
(25)m=	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
3 He	at losse	s and he	at loss r	paramete	⊃r.									
ELEN		Gros		Openin		Net Ar	ea	U-valu	Je	AXU		k-value)	AXk
		area		m		A ,r		W/m2		(W/I	K)	kJ/m ² ·		kJ/K
Windo	ws Type	e 1				3.25	x1.	/[1/(1.5)+	0.04] =	4.6				(27)
Windo	ws Type	2				14.45	5 x1.	/[1/(1.5)+	0.04] =	20.45				(27)
Wall <mark>s</mark> ⁻	Type1	32.2	:1	0		32.21	x	0.18		5.8				(29)
Walls ⁻	Type2	11.6	9	0		11.69) X	0.18		2.1	ה ר		Ξ Ε	(29)
Walls ⁻	ТуреЗ	24.2	3	14.4	5	9.78	x	0.18	=	1.76	i F		\exists	(29)
Walls ⁻	Type4	10.5	5	0		10.55	5 X	0.18	= [1.9			\exists	(29)
Walls ⁻	Type5	15.3	9	9.75		5.64	×	0.18	= 	1.02	= i		\exists	(29)
	area of e					94.05			I		L			(31)
				ffective wi	ndow U-va			, formula 1,	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	(0.)
				ternal wall			0			, <u> </u>	0	, ,,		
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				46.82	2 (33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	0				construct	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
			tailed calci x Y) cal	culated u	isina Ar	nendix k	<						47	(36)
	-			own (36) =		-	`						4.7	(30)
	abric he			01111 (00) -	- 0.70 x (0	')			(33) +	(36) =			51.5	2 (37)
Ventila	tion hea	at loss ca	alculated	I monthly	/				(38)m	= 0.33 × (25)m x (5)		
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(38)m=	52.4	52.13	51.87	50.64	50.41	49.34	49.34	49.14	49.75	50.41	50.88	51.36	1	(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	103.92	103.65	103.39	102.16	101.93	100.86	100.86	100.66	101.27	101.93	102.4	102.88	1	
										Average =	u Sum(39)₁	12 /12=	102.1	6 (39)

Heat lo	ss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.07	1.07	1.07	1.06	1.05	1.04	1.04	1.04	1.05	1.05	1.06	1.06		
			I		1	1	1	ļ	I,	L Average =	Sum(40)1	12 /12=	1.06	(40)
Numbe	-	1	nth (Tab	, 1			<u> </u>						1	
(11)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF. if TF.	A > 13.9 A £ 13.9	9, N = 1	+ 1.76 x			•)2)] + 0.0		TFA -13.		71]	(42)
Reduce	the annua	al average	hot water		5% if the c	lwelling is	designed	(25 x N) to achieve		se target o		.51		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	: (43)					1	
(44)m=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42	108.36		-]
Energy o	content of	hot water	used - ca	culated m	onthly $= 4$.	190 x Vd,ı	m x nm x L	OTm / 3600			ım(44) ₁₁₂ = ables 1b, 1		1182.14	(44)
(45)m=	160.7	140.55	145.03	126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		_
lf instant	<mark>ane</mark> ous w	ater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =	-	1549.97	(45)
(46)m=	24.1	21.08	21.76	18. <mark>97</mark>	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
Water Storage	-		Vincludir	ng any se	olar or W	WHRS	storage	within sa	ame ves	sel		150	1	(47)
-				ank in dv								100		()
	-	-			-			ombi boil	ers) ente	er '0' in ((47)			
Water	-			<i>.</i> .		(1.)	/ I						1	
				oss facto	or is kno	wn (kvvi	n/day):					65		(48)
•			m Table					(40) (40)				54		(49)
			-	e, kWh/ye cylinder		or is not	known:	(48) x (49)) =		0.	89		(50)
Hot wa	ter stor	age loss		rom Tab								0]	(51)
	•	from Ta		011 4.5								0]	(52)
			m Table	2b								0		(53)
Energy	lost fro	m water	r storage	, kWh/y	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter	(50) or ((54) in (5	55)	-							0.	89		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
If cylinde	r contain:	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – ([H11)] ÷ (5	50), else (5	7)m = (56)	m where ((H11) is fro	m Append	lix H	
(57)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(57)
Primary	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
							. ,	65 × (41)		u 41a a	etet)			
(moc (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	r thermo 23.26	22.51	23.26	1	(59)
(53)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]	(00)

Combi	loss ca	alculated	for eac	h mont	h (61)m =	(60)) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0		0	0	0	0	0	0	0		(61)
Total h	eat rec	uired for	water	heating	calculate	d for	eac	n month	(62)m =	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	211.63	186.55	195.96	6 175.7	3 172.25	15	3.98	147.94	162.25	161.94	182.22	192.6	206.55]	(62)
Solar DH	IW input	calculated	using Ap	opendix (or Appendi	x H (ı	negati	ve quantity	/) (enter 'C)' if no sola	r contribu	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	S and/o	r 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	vater hea	ter							-	-	_	-		
(64)m=	211.63	186.55	195.96	6 175.7	3 172.25	15	3.98	147.94	162.25	161.94	182.22	192.6	206.55		-
	Output from water heater (annual) ₁₁₂ 2149.59 (64)														
Heat g	ains fro	om water	heatin	g, kWh	month 0.2	25 ´ [[0.85	× (45)m	+ (61)n	n] + 0.8 >	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	94.17	83.53	88.96	81.4	7 81.08	74	4.24	73	77.76	76.88	84.39	87.08	92.49		(65)
inclu	de (57))m in calo	culatior	n of (65	m only if	cylin	der 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	ба):										
Metab	olic gai	ns (Table	e 5), Wa	atts							-		-	_	
	Jan	Feb	Mar	Ар	r May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	135.39	135.39	135.39	135.3	9 135.39	13	5.39	135.39	135.39	135.39	1 <mark>3</mark> 5.39	135.39	135.39		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	(calcula	ted in <i>I</i>	Append	x L, equa	tion	L9 o	r L9a), <mark>a</mark>	lso see	Table 5					
(67)m=	22.38	19.88	1 <mark>6</mark> .17	12.2	9.15	7	.72	8.35	10.85	14.56	18.49	21.58	23		(67)
App <mark>lia</mark>	nces ga	ains (ca <mark>lc</mark>	ulated	in Appe	endix L, ec	juati	on L	13 or L1	3a), also	o see Ta	ble 5				
(68)m=	<mark>25</mark> 1.05	253.65	247.09	233.1	1 215.47	19	8.89	187.81	185.21	191.77	205.75	223.39	239.97		(68)
Cookir	g gains	s (calcula	ted in .	Append	ix L, equa	ition	L15	or L15a)	, also s	ee Table	5				
(69)m=	36.54	36.54	36.54	36.5	4 36.54	36	6.54	36.54	36.54	36.54	36.54	36.54	36.54		(69)
Pumps	and fa	ins gains	(Table	5a)										·	
(70)m=	3	3	3	3	3		3	3	3	3	3	3	3		(70)
Losses	s e.g. e	vaporatio	n (neg	ative va	lues) (Tal	ble 5	5)				•				
(71)m=	-108.31	-108.31	-108.3	I -108.3	1 -108.31	-10	8.31	-108.31	-108.31	-108.31	-108.31	-108.31	-108.31		(71)
Water	heating	, g gains (T	able 5)	•	•				-		-			
(72)m=	126.58	124.3	119.58	3 113.1	5 108.98	10	3.11	98.12	104.51	106.78	113.43	120.94	124.31		(72)
Total i	nterna	I gains =		•	•		(66)	m + (67)m	ı + (68)m	+ (69)m +	(70)m + (71)m + (72)	m		
(73)m=	466.62	464.45	449.45	5 425.1	2 400.22	37	6.34	360.89	367.19	379.74	404.29	432.53	453.9]	(73)
6. So	lar gain	IS:		-	•						<u>.</u>	-			
Solar g	ains are	calculated	using so	lar flux fr	om Table 6a	and	assoc	ated equa	tions to co	onvert to th	ne applica	ble orientat	ion.		
Orienta		Access F		Ar			Flu		_	g_	-	FF		Gains	
		Table 6d		n	2	_	Ta	ole 6a	1	able 6b	1	able 6c		(W)	_
East	0.9x	3		x	3.25	×	1	9.64	x	0.63	x	0.7	=	58.52	(76)
East	0.9x	3		x	3.25	x	3	8.42	x	0.63	x	0.7	=	114.48	(76)
East	0.9x	3		x	3.25	×	6	3.27	x	0.63	x [0.7	=	188.54	(76)
East	0.9x	3		x	3.25	× [g	2.28	x	0.63	×	0.7	=	274.97	(76)
East	0.9x	3		x	3.25	×	1	13.09	x	0.63	x	0.7	=	336.99	(76)

East	0.9x	3	x	3.2	25	x	1	15.77	x	0.63	x	0	.7	=	344.96	(76)
East	0.9x	3	x	3.2	25	x	1	10.22	x	0.63	x	0	.7	=	328.42	(76)
East	0.9x	3	x	3.2	25	x	g	4.68	x	0.63	x	0	.7] =	282.11	(76)
East	0.9x	3	x	3.2	25	x	7	3.59	x	0.63	x	0	.7	-	219.28	(76)
East	0.9x	3	x	3.2	25	x	4	5.59	x	0.63	x	0	.7	-	135.84	(76)
East	0.9x	3	×	3.2	25	x	2	4.49	x	0.63	x	0	.7	= [72.97	(76)
East	0.9x	3	×	3.2	25	x	1	6.15	x	0.63	×	0	.7	= [48.13	(76)
South	0.9x	0.77	×	14.	45	x	4	6.75	x	0.63	×	0	.7	=	206.46	(78)
South	0.9x	0.77	×	14.	45	x	7	6.57	x	0.63	x	0	.7	= [338.13	(78)
South	0.9x	0.77	×	14.	45	x	g	7.53	x	0.63	x	0	.7	= 1	430.72	(78)
South	0.9x	0.77	×	14.	45	x	1	10.23	x	0.63	×	0	.7	-	486.81	(78)
South	0.9x	0.77	×	14.	45	x	1	14.87	x	0.63	×	0	.7	- -	507.28	(78)
South	0.9x	0.77	×	14.	45	x	1	10.55	x	0.63	×	0	.7	- -	488.19	(78)
South	0.9x	0.77	×	14.	45	x	1	08.01	x	0.63	×	0	.7	-	476.99	(78)
South	0.9x	0.77	×	14.	45	x	1	04.89	x	0.63	×	0	.7	- =	463.23	(78)
South	0.9x	0.77	×	14.	45	x	1	01.89	x	0.63	×	0	.7	- =	449.94	(78)
South	0.9x	0.77	×	14.	45	x	8	2.59	x	0.63	×	0	.7	- -	364.71	(78)
Sout <mark>h</mark>	0.9x	0.77	×	14.	45	X	5	5.42	x	0.63	x	0	.7	=	244.73	(78)
South	0.9x	0.77	×	14.	45	x		40.4	x	0.63	x	0	.7	=	178.4	(78)
Solar	ains in	watts, ca	loulato	d for eac	h mont	h			(83)m	= Sum(74)n	n (82)n	0				
(83)m=	264.98	452.61	619.26	761.78	844.27	-	33.16	805.41	745				.7 2	26.53		(83)
	ains – i	nternal a		r (84)m =	I = (73)m	+ (83)m	, watts	<u> </u>		_					
(84)m=	731.61	917.07	1068.71	1186.9	1244.4	9 1	209.5	1166.31	1112	2.52 1048.9	5 904.8	34 750	23 6	80.43		(84)
7 Mo	an inter	nal temp	oraturo	(heating	1 20220				1				- 1			
							area	rom Tak	nle 9	Th1 (°C)					21	(85)
-		tor for ga	• •			-			010 0,	(0)					21	(00)
Othiot	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	A	ug Sep		t N	v	Dec		
(86)m=	0.99	0.98	0.95	0.86	0.71	-	0.53	0.38	0.4	<u> </u>	0.9	_	_	1		(86)
	interne				L	follo			<u>і </u>						l	
(87)m=	20.01	l tempera 20.24	20.52	20.79	20.94	-	20.99	21 21 25 25 25 25 25 25 25 25 25 25 25 25 25	2 [′]	<u>_</u>	20.7	6 20.3	22 /	19.96]	(87)
		<u> </u>		Į	ļ	_						0 20.		19.90		(0,)
•		<u> </u>	01	1	r	-			r), Th2 (°C)	<u> </u>				1	(00)
(88)m=	20.02	20.02	20.03	20.04	20.04	2	20.05	20.05	20.	20.04	20.0	4 20.0	04 2	20.03		(88)
Utilisa	ation fac	tor for ga	ains for	rest of d	welling	, h2	,m (se	e Table	9a)		_					
(89)m=	0.99	0.98	0.93	0.83	0.65		0.45	0.3	0.3	0.56	0.87	7 0.9	8	0.99		(89)
Mean	interna	l tempera	ature in	the rest	of dwe	lling	T2 (f	ollow ste	eps 3	to 7 in Ta	ble 9c)					
(90)m=	18.71	19.05	19.45	19.81	19.98	2	20.04	20.05	20.	05 20.03	19.7	8 19.	8	18.66		(90)
											fLA = L	iving area	÷ (4) =		0.41	(91)
Mean	interna	l tempera	ature (fo	or the wh	ole dw	ellin	a) = fl	_A × T1	+ (1	– fLA) × T	2					
(92)m=		<u> </u>					<u>.</u> , .,		<u>ر</u>	,					_	
(92)11=	19.25	19.54	19.89	20.21	20.38	2	20.43	20.44	20.4	44 20.42	20.1	9 19.0	65 ⁻	19.19		(92)

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

	1											I	(00)
(93)m= 19.25	19.54	19.89	20.21	20.38	20.43	20.44	20.44	20.42	20.19	19.65	19.19		(93)
8. Space he							Table O	() .	· T ' · · · · /	70)		let.	
Set Ti to the the utilisation					ied at ste	epitor	I adle 91	o, so tha	t 11,m=(76)m an	d re-caid	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	ctor for g	i ains, hm											
(94)m= 0.99	0.97	0.93	0.83	0.67	0.48	0.33	0.36	0.59	0.87	0.98	0.99		(94)
Useful gains	, hmGm	, W = (94	4)m x (84	4)m	•		•						
(95)m= 724.45	891.16	992.63	987.4	838.78	582.2	386.55	405.54	621.79	790.96	732.37	675.66		(95)
Monthly ave	rage exte	ernal tem	perature	e from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m= 1553.22	2 1517.78	1384.12	1155.54	884.43	588.23	387.19	406.61	639.57	977.03	1285.31	1542.67		(97)
Space heati		1	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m		1	
(98)m= 616.6	421.09	291.27	121.06	33.96	0	0	0	0	138.43	398.11	645.05		
							Tota	l per year	(kWh/year	[.]) = Sum(9	8)15,912 =	2665.58	(98)
Space heati	ng requir	ement in	kWh/m²	²/year								27.54	(99)
9a. Energy re	auiremei	nts – Indi	ividual h	eatina s	vstems i	ncludina	micro-C	CHP)					
Space heat								,			_		
Fraction of s	-	at from s	econdar	y/supple	mentary	system				_		0	(201)
Fraction of s	pace hea	at from m	nain syst	em(s)			(20 <mark>2)</mark> = 1 ·	(201) =				1	(202)
Fraction of to							(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of		-						· · ·					(206)
												93.5	
Efficiency of	seconda	ry/suppl	ementar	y neatin	g system							0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heati	Ť	i È	1	1	í	<u> </u>						l	
616.6	421.09	291.27	121.06	33.96	0	0	0	0	138.43	398.11	645.05		
(211)m = {[(9	í ``	04)] } x 1	00 ÷ (20)6)	•		1					1	(211)
659.46	450.36	311.52	129.48	36.32	0	0	0	0	148.06	425.79	689.89		
							Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	2850.89	(211)
Space heati	•			month									
= {[(98)m x (2	1	1			<u> </u>						-	l	
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		—
							lota	l (kWh/yea	ar) = Sum(2)	215) _{15,1012}	Ē	0	(215)
Water heatin	-												
Output from v					452.00	4 47 04	400.05	404.04	400.00	100.0	000 55	l	
211.63		195.96	175.73	172.25	153.98	147.94	162.25	161.94	182.22	192.6	206.55	70.0	
Efficiency of v	1	r						70.0		00.74	07.05	79.8	(216)
(217)m= 87.5	86.92	85.87	83.84	81.38	79.8	79.8	79.8	79.8	84.09	86.71	87.65		(217)
Fuel for wate (219)m = (64	•												
(219)m = 241.85	T	228.21	209.59	211.65	192.96	185.39	203.32	202.93	216.69	222.12	235.66		
	1							l = Sum(2	19a) ₁₁₂ =			2564.97	(219)
Annual total	5									Wh/year		kWh/yea	
Space heatin		ed, main	system	1								2850.89	
													1

					1
Water heating fuel used				2564.97	
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	\$	sum of (230a)(230g) =		75	(231)
Electricity for lighting				395.26	(232)
12a. CO2 emissions - Individual heating systems	including micro-C	ΉP			-
	Energy kWh/year	Emission fac kg CO2/kWh	tor	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216	=	615.79	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	554.03	(264)
Space and water heating	(261) + (262) + (263)) + (264) =		1169.83	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	205.14	(268)
Total CO2, kg/year TER =		sum of (265)(271) =		1413.89 14.61	(272)

		Use	r Details:										
Assessor Name: Stroma Number: Software Name: Stroma FSAP 2012 Software Version: Version: 1. Property Address: 6 Property Address: 6													
		Prope	ty Address:	6									
Address : 1. Overall dwelling dime	ensions:												
		Δ	rea(m²)		Av. Hei	iaht(m)		Volume(m ³)					
Ground floor				(1a) x		.85	(2a) =	214.03	(3a)				
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	75.1	(4)] [
Dwelling volume	, , , , , , , , , , , , , , , , , , , ,	, , , _)+(3c)+(3d	l)+(3e)+	.(3n) =	214.03	(5)				
								211.00					
2. Ventilation rate:	main so	econdary	other		total			m ³ per hou					
Number of chimpove	heating h	eating		7 = Г			40 =	-	-				
Number of chimneys		0	0	- <u>-</u>	0		l	0	(6a)				
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)				
Number of intermittent fa	ans				3	Х ′	10 =	30	(7a)				
Number of passive vents	3				0	Х ′	10 =	0	(7b)				
Number of flueless gas f	ires				0	X 4	40 =	0	(7c)				
							Air ch	anges <mark>per</mark> ho	ur				
Infiltration due to chimne					30		÷ (5) =	0.14	(8)				
	been carried out or is intende	ed, proceed to (1	7), otherwise o	continue fr	om (9) to ((16)			٦				
Number of storeys in t Additional infiltration	he dwelling (ns)					[(0)	11-0.4	0	(9)				
).25 for steel or timber	frame or 0.35	for masonr	v constr	uction	[(9)	-1]x0.1 =	0	(10) (11)				
if both types of wall are p	present, use the value corres			•	dottorr		l	0					
deducting areas of openi If suspended wooden	ings); if equal user 0.35 floor, enter 0.2 (unseal	ed) or 0 1 (se	aled) else	enter 0				0	(12)				
If no draught lobby, er			(aloa), oloo					0	(12)				
0 1	s and doors draught st	ripped						0	(14)				
Window infiltration	C C		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)				
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)				
Air permeability value,	, q50, expressed in cub	oic metres per	hour per s	quare m	etre of e	nvelope	area	5	(17)				
If based on air permeabi	lity value, then (18) = [(1	7) ÷ 20]+(8), oth	erwise (18) = (16)				0.39	(18)				
	es if a pressurisation test has	s been done or a	degree air pe	rmeability	is being us	sed			٦				
Number of sides sheltere Shelter factor	e		(20) = 1 -	[0.075 x (1	9)] =			3	(19)				
Infiltration rate incorpora	ting shelter factor		(21) = (18)		-/]			0.78	(20) (21)				
Infiltration rate modified	-	4		, (- ,			l	0.3					
Jan Feb	Mar Apr May	Jun Ju	l Aug	Sep	Oct	Nov	Dec						
Monthly average wind sp		II											
(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 (22-) (2		I	I										
Wind Factor $(22a)m = (2)$ (22a)m 1.27 1.25	(2)m ÷ 4 1.23 1.1 1.08	0.95 0.9	5 0.92	1	1.08	1.12	1.18						
	1.1 1.00	0.00 0.9	0.32	'	1.00	1.12	1.10						

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m		-			
<u> </u>	0.39	0.38	0.37	0.33	0.33	0.29	0.29	0.28	0.3	0.33	0.34	0.36		
		c <i>tive air</i> al ventila	-	rate for t	he appli	cable ca	se							(23a)
				andix N (2	3h) - (23a	a) x Emv (e	equation (1	N5)) , othei	rwise (23h) – (23a)			0	
								n Table 4h)) = (200)			0	(23b)
			-	-	-			HR) (24a		$(b)m \pm (b)$	23h) v [*	(23c)	0 · 1001	(23c)
(24a)m=					0			0	$0^{111} = (22)^{111}$	0		0	- 100j	(24a)
· · ·		-	-	-		-				-	-	U		(2.0)
(24b)m=								VV) (24b	0 = (22)	0	0	0		(24b)
								n from c			Ŭ	•		()
,					•			c) = (22b		5 x (23b))			
(24c)m=	, <i>,</i>	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	n or wh	ole hous	e positiv	/e input '	ventilatio	n from l	oft					
								0.5 + [(2		0.5]				
(24d)m=	0.57	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)		-			
(25)m=	0.57	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
3. He	at losse	s and he	eat loss i	paramete	er:									_
ELEN		Gros		Openin		Net Ar	ea	U-valu	Je	AXU		k-value		AXk
		area		'n		A ,r	n²	W/m2	K	(VV/I	<)	kJ/m²·ł		kJ/K
Windo	ws					18.77	7 x1	/[1/(1.5)+	0.04] =	26.56				(27)
Wall <mark>s</mark> ⁻	Type1	23.9	94	0		23.94	1 X	0.18	_ = [4.31				(29)
Wall <mark>s</mark> ⁻	Type2	28.7	'8	0		28.78	3 ×	0.18	=	5.18				(29)
Walls ⁻	Туре3	21.6	6	18.7	7	2.89	x	0.18	=[0.52				(29)
Walls -	Type4	10.8	3	0		10.83	3 X	0.18	=	1.95	- 		\neg	(29)
Total a	rea of e	elements	, m²			85.22	2							(31)
* for win	dows and	roof wind	ows, use e	effective wi	ndow U-va	alue calcul	ated using	g formula 1,	/[(1/U-valu	ve)+0.04] a	ns given in	paragraph	3.2	
				nternal wal	ls and par	titions			<i>(</i>)					
		ss, W/K :		U)				(26)(30)					38.52	(33)
		Cm = S(2) + (32a).	(32e) =	0	(34)
		•	•	P = Cm ÷	,					tive Value			250	(35)
	-	sments wh ad of a de			construct	ion are not	t known pr	recisely the	e indicative	values of	TMP in Ta	able 1f		
				culated (using Ap	pendix ł	<						4.26	(36)
	-		,	own (36) =	• •	•								`
Total f	abric he	at loss							(33) +	(36) =			42.78	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y		_		(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	40.56	40.36	40.16	39.22	39.05	38.23	38.23	38.08	38.54	39.05	39.4	39.77		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	83.35	83.14	82.94	82.01	81.83	81.01	81.01	80.86	81.33	81.83	82.18	82.56		
										Average =	Sum(39)1	12 /12=	82	(39)

Heat lo	oss para	ameter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.11	1.11	1.1	1.09	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.1		
			nth (Tab					1		Average =	Sum(40)1	₁₂ /12=	1.09	(40)
NULLIDE	Jan	Feb	Mar	, ,	May	lun	Jul	Δυα	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	Apr 30	31	Jun 30	31	Aug 31	30	31	30	31		(41)
(41)11-	51	20	51	30	51	- 50		51	- 50	51	- 30	51		(41)
4. Wa	ater hea	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		36		(42)
Reduce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.33		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	: (43)						
(44)m=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		-
Ener <mark>gy</mark> (content of	hot water	used - ca	culated m	onthly $= 4$.	190 x Vd,i	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1083.95	(44)
(45)m=	147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		_
lf instan	taneous v	vater heati	ng at poin	t of use (no	o hot water	storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1421.23	(45)
(46)m=	22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
	storage		10.00	17.55	10.00	14.4	10.04	10.01	10.40	10.00	13.71	21.41		(10)
Storag	e volum	ne (litres)) includir	ng any se	olar or N	/WHRS	storage	within sa	a <mark>me ve</mark> s	sel		150		(47)
	•	-			velling, e			. ,						
			hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage		eclared I	oss facto	or is kno	wn (kWł	n/dav).				1	65		(48)
			m Table				"day".					54		(49)
			storage		ear			(48) x (49)) =			89		(50)
0,			•		loss fact	or is not								()
		-			le 2 (kW	h/litre/da	ay)					0		(51)
		ieating s from Ta	see secti	on 4.3								0	1	(50)
			om Table	2b								0	r	(52) (53)
			r storage		aar			(47) x (51)) x (52) x (53) -				(54)
•••		(54) in (5	-	,, y) x (02) x (00) –		0 89		(55)
	. ,	. , .	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
								50), else (5					l lix H	
(57)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(57)
Primar	v circuit	loss (ar	nual) fro	om Table	 e 3	-	-	-	-	-	-	0		(58)
Primar	y circuit	loss cal	culated	for each	month (,	. ,	65 × (41)		r thar na -			I	
(moo (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)
(55)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		(00)

Combi	loss ca	alculated	for eac	ch	month (61)m =	(60)) ÷ 36	65 × (41)	m								
(61)m=	0	0	0		0	0		0	0	0	0	0		0	0			(61)
Total h	eat rec	uired for	water	he	ating ca	alculated	l fo	r each	n month	(62)m	= 0.85 ×	(45)m) +	(46)m +	(57)m	+ ((59)m + (61)m	
(62)m=	198.28	174.87	183.9	1	165.22	162.17	14	45.28	139.88	153.0 ⁻	152.58	171.	31	180.69	193.6	3		(62)
Solar Dł	-IW input	calculated	using A	ppe	ndix G or	Appendix	н (negativ	/e quantity) (enter	'0' if no sola	ar contr	ibut	ion to wate	r heatin	ıg)		
(add a	ddition	al lines if	FGHR	Sa	and/or V	VWHRS	ap	plies,	see Ap	pendix	G)							
(63)m=	0	0	0		0	0		0	0	0	0	0		0	0			(63)
Output	from v	vater hea	ter								_							
(64)m=	198.28	174.87	183.9	1	165.22	162.17	14	45.28	139.88	153.01	152.58	171.	31	180.69	193.6	3		,
										O	utput from w	ater he	eate	r (annual) _{1.}	12	L	2020.84	(64)
Heat g	ains fro	om water	heatin	g,	kWh/m	onth 0.2	5 ´	[0.85	× (45)m	+ (61)	m] + 0.8	x [(46)m	+ (57)m	+ (59))m []	
(65)m=	89.73	79.65	84.96	;	77.98	77.73	7	1.35	70.32	74.68	73.77	80.7	77	83.12	88.19)		(65)
inclu	ide (57)m in calo	culatio	n o	f (65)m	only if c	ylir	nder is	s in the c	dwellin	g or hot v	vater i	s fi	rom com	munity	/ he	eating	
5. Int	ernal g	jains (see	e Table	e 5	and 5a):												
Metab	olic gai	ns (Table	e 5), W	att	S		_											
	Jan	Feb	Ma	r	Apr	Мау		Jun	Jul	Aug	Sep	00	ct	Nov	Deo	С		
(66)m=	118.17	118.17	118.1	7	118.17	118.17	1'	18.17	118.17	118.17	118.17	118.	17	118.17	118.1	7		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	s (calcula	ted in <i>i</i>	Ap	pendix	_, equat	ion	L9 or	[.] L9a), a	lso see	Table 5							
(67)m=	1 <mark>8.62</mark>	16.54	13.45		10. <mark>1</mark> 8	7.61	6	5.43	6.94	9.03	12.12	15.3	38	17.96	19.14	t		(67)
App <mark>lia</mark>	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uat	ion L'	13 o <mark>r L1</mark> :	3a), al	so see Ta	able 5						
(68)m=	208.9	211.06	205.6		193.97	179.29	1	65.5	156.28	154.11	159.57	171	.2	185.88	199.6	8		(68)
Cookir	ig gain	s (calcula	ated in	Ap	pendix	L, equat	ion	1 L15	or L15a)	, also	see Table	e 5				_		
(69)m=	34.82	34.82	34.82	:	34.82	34.82	3	4.82	34.82	34.82	34.82	34.8	32	34.82	34.82	2		(69)
Pumps	and fa	ans gains	(Table	e 5a	a)									-		_		
(70)m=	3	3	3		3	3		3	3	3	3	3		3	3			(70)
Losses	s e.g. e	vaporatio	n (neg	jati	ve valu	es) (Tab	le :	5)								_		
(71)m=	-94.53	-94.53	-94.53	3	-94.53	-94.53	-9	94.53	-94.53	-94.53	-94.53	-94.	53	-94.53	-94.53	3		(71)
Water	heating	, g gains (T	Table 5	5)										•		_		
(72)m=	120.61	118.52	114.1	9	108.3	104.48	9	9.09	94.51	100.38	3 102.46	108.	56	115.44	118.5	3		(72)
Total i	nterna	l gains =						(66)	m + (67)m	+ (68)n	n + (69)m +	(70)m ·	+ (7	'1)m + (72)	m	_		
(73)m=	409.58	407.58	394.7	·	373.91	352.83	33	32.47	319.19	324.97	7 335.6	356	.6	380.73	398.8	3		(73)
6. So	lar gair	is:	•															
Solar g	ains are	calculated	using so	olar	flux from	Table 6a	and	associ	ated equa	tions to	convert to t	he appl	icat	ole orientat	ion.			
Orienta	ation:	Access F			Area			Flu					-	FF			Gains	
		Table 6d			m²		_	Tab	ole 6a		Table 6b		-	able 6c		_	(VV)	_
North	0.9x	0.77		x	18.	77	x	1	0.63	x	0.63	x		0.7		= [61	(74)
North	0.9x	0.77		x	18.	77	x	2	0.32	x	0.63	x	Ē	0.7	-	- [116.57	(74)
North	0.9x	0.77		x	18.	77	x	3	4.53	x	0.63	x		0.7	=	= [198.08	(74)
North	0.9x	0.77		x	18.	77	x	5	5.46	x	0.63	×		0.7	=	= [318.16	(74)
North	0.9x	0.77		x	18.	77	x	7	4.72	x	0.63	x		0.7	-	- [428.6	(74)

							_							
North 0.9x	0.77	×	18.	77	x	79.99	×		0.63	×	0.7	=	458.82	(74)
North 0.9x	0.77	x	18.	77	x	74.68	x		0.63	x	0.7	=	428.37	(74)
North 0.9x	0.77	×	18.	77	x	59.25	x		0.63	×	0.7	=	339.86	(74)
North 0.9x	0.77	x	18.	77	x	41.52	x		0.63	×	0.7	=	238.15	(74)
North 0.9x	0.77	x	18.	77	x	24.19	×		0.63	×	0.7	=	138.76	(74)
North 0.9x	0.77	x	18.	77	x	13.12	x		0.63	x	0.7	=	75.25	(74)
North 0.9x	0.77	x	18.	77	x	8.86	x	:	0.63	×	0.7	=	50.85	(74)
Solar <u>g</u> ains in	watts, calcu	ulated	for eacl	n month			(83))m = S	um(74)m .	(82)m				
(83)m= 61		98.08	318.16	428.6		58.82 428.3		39.86	238.15	138.76	75.25	50.85		(83)
Total gains –	internal and	solar	(84)m =	: (73)m	+ (8	33)m , watt	s							
<mark>(84)m=</mark> 470.58	524.15 59	92.77	692.07	781.43	79	91.29 747.5	66 66	64.83	573.76	495.36	455.98	449.65		(84)
7. Mean inte	rnal tempera	ature ((heating	seasor)									
Temperature	e during hea	ting p	eriods ir	the livi	ng	area from 7	able	9, Th	1 (°C)				21	(85)
Utilisation fa	ctor for gain	s for li	iving are	a, h1,m	n (s	ee Table 9a	a)							
Jan	Feb	Mar	Apr	May		Jun Jul		Aug	Sep	Oct	Nov	Dec		
(86)m= 1	1 ().99	0.95	0.83	(0.63 0.47	, O).55	0.83	0.97	1	1		(86)
Mean interna	al temperatu	re in I	iving are	a T1 (f	مالم	w steps 3 t	0 7 in	Table	- 9c)		•			
(87)m= 19.84	1	0.22	20.58	20.86	T -	0.97 21		0.99	20.89	20.53	20.13	19.82		(87)
Tomporature		ting p	oriodo ir	root of	du	olling from	Toble							
Temperature	T	20	20.01	20.01	-	0.02 20.0		0.02	20.01	20.01	20.01	20		(88)
	<u> </u>				1				20.01	20.01	20.01	20		(00)
Utilisation fa		T			T -									(00)
(89)m= 1	0.99 0).98	0.93	0.78		0.54 0.37	0).44	0.76	0.96	0.99	1		(89)
Mean interna	al temperatu	re in t	he rest	of dwell	ing	T2 (follow	steps	3 to 7	7 in Tabl	,				
(90)m= 18.44	18.64 1	9.01	19.51	19.87		20 20.0	2 2	0.02	19.93	19.47	18.88	18.42		(90)
									f	LA = Livi	ng area ÷ (4	4) =	0.47	(91)
Mean interna	al temperatu	re (fo	r the wh	ole dwe	llin	g) = fLA × T	Г1 + (⁻	1 – fL	A) × T2					
(92)m= 19.11	19.27 1	9.58	20.02	20.34	2	0.46 20.4	8 2	0.48	20.39	19.97	19.47	19.08		(92)
Apply adjust	ment to the	mean	internal	temper	atu	re from Tal	ole 4e	, whe	ere appro	priate				
(93)m= 19.11	19.27 1	9.58	20.02	20.34	2	0.46 20.4	8 2	0.48	20.39	19.97	19.47	19.08		(93)
8. Space hea														
Set Ti to the the utilisatior			•		ned	at step 11	of Tal	ble 9t	o, so tha	t Ti,m=	(76)m an	d re-calc	ulate	
Jan				May	Г	Jun Jul		Aug	Sep	Oct	Nov	Dec		
Utilisation fa		Mar shm	Apr	iviay				Aug	Sep	OCI	INOV	Dec		
(94)m= 1	1 <u> </u>	0.98	0.93	0.8		0.58 0.42).49	0.79	0.96	0.99	1		(94)
Useful gains		/ = (94		1)m	I									
(95)m= 468.58	1 1	30.84	644.15	621.35	4	61.67 312.	5 32	25.64	452.42	476.44	452.16	448.14		(95)
Monthly ave	rage externa	al tem	perature	from T	abl	e 8					1			
(96)m= 4.3	1 1	6.5	8.9	11.7	-	14.6 16.6	; 1	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for mean i	intern	al tempe	erature,	Lm	, W =[(39)	m x [(93)m-	– (96)m]				
(97)m= 1233.98	3 1194.8 10	85.03	911.65	706.97	4	74.95 314.3	37 32	29.73	511.26	766.96	1016.87	1228.53		(97)
Space heatir	ng requireme	ent foi	r each m	nonth, k	Wh	/month = 0	.024 x	< [(97))m – (95)m] x (4	11)m			
<mark>(98)m=</mark> 569.45	453.46 37	75.12	192.6	63.7		0 0		0	0	216.14	406.59	580.61		

								Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	2857.68	(98)
Space	e heatin	g require	ement in	n kWh/m	²/year								38.05	(99)
9a. En	ergy rec	luiremer	nts – Ind	ividual h	neating s	ystems i	ncluding	micro-C	CHP)					
	e heatir	•			. /									
					ry/supple	mentary			(201)				0	(201)
		ace hea		-	. ,			(202) = 1 -		(000)]			1	(202)
		tal heati	-	-				(204) = (20	02) × [1 –	(203)] =			1	(204)
		nain spa		•••									93.5	(206)
Efficie	ency of s			ementa	ry heating	g system	ז, % י			1			0	(208)
•	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space	e heatin 569.45	g require 453.46	ement (0 375.12	192.6	ed above)	0	0	0	216.14	406.59	580.61	l	
(044)						0	0	0	0	210.14	400.59	560.01		(244)
(211)m	$1 = \{[(98) \\ 609.04]$)m x (20 484.99	4)] } X 1 401.19	100 ÷ (2 205.99	68.13	0	0	0	0	231.17	434.85	620.97		(211)
	000.04	404.00	401.13	200.00	00.10	0	0	-	-	ar) =Sum(2			3056.34	(211)
Space	e heatin	g fuel (s	econdar	·v) kWh	/month					, ,	× 15, 101	2	0000.01	
· ·		1)]}x1		• • •	, montan									
(215) <mark>m=</mark>	0	0	0	0	0	0	0	0	0	0	0	0		
								Tota	l (kWh/yea	ar) =Sum(2	2 15) _{15,101}	2=	0	(215)
	heating													
Output	from wa	ater hea 174.87	ter (calc 183.91	ulated a	above) 162.17	145.28	139.88	153.01	152.58	171.31	180.69	193.63		
Efficier		ater hea		100.22	1.02.00	110.20		100.01	102.00		100.00	100.00	79.8	(216)
(217)m=	,	87.24	86.68	85.22	82.55	79.8	79.8	79.8	79.8	85.43	86.91	87.56		(217)
Fuel fo	r water	heating,	kWh/m	onth										
. ,		m x 100			1								I	
(219)m=	226.68	200.44	212.18	193.87	196.45	182.06	175.29	191.74	191.2 I = Sum(2	200.52	207.9	221.13		
٨٥٩٠٠٥	l totals							TOTA	i = 3um(2		Mhhaa		2399.45 kWh/yea	(219)
		fuel use	ed, main	system	1					ĸ	Wh/yea		3056.34	
•	-	fuel use											2399.45	
	•			electric	keep-ho	t								
		g pump		olootilo		·						20	l	(230c)
		an-assis										30		
					~ #			0.100	of (220a)	(220a) -		45		(230e)
		for the	above,	kvvn/yea	ar			Sum	01 (2308).	(230g) =			75	(231)
	city for li												328.89	(232)
-12a. (CO2 em	issions -	– Individ	lual hea	ting syste	ems inclu	uding mi	cro-CHP						
							ergy /h/year			Emiss kg CO2	ion fac 2/kWh	tor	Emission kg CO2/ye	
Space	heating	(main s	ystem 1)		(211	1) x			0.2	16	=	660.17	(261)

Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	518.28	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1178.45	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	170.7	(268)
Total CO2, kg/year	sum	of (265)(271) =		1388.07	(272)

TER =

18.48 (273)



		Us	er Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Prope	erty Address:	9					
Address : 1. Overall dwelling dime	ensions:								
	611310113.		Area(m²)		Av. Hei	aht(m)		Volume(m ³)	
Ground floor		Г	. ,	(1a) x		85	(2a) =	383.61	(3a)
Total floor area TFA = (1	la)+(1b)+(1c)+(1d)+(1e	∟ e)+(1n) [134.6	(4)			J [
Dwelling volume	, , , , , , , , , ,	, , , L)+(3c)+(3d))+(3e)+	.(3n) =	383.61	(5)
								000.01	
2. Ventilation rate:	main s	econdary	other		total			m ³ per hour	
Number of chimneys	heating	neating] = [40 =	-	-
-			0] ⁻ [] ₌ [0		20 =	0	(6a)
Number of open flues	0	0 +	0] - [0		l	0	(6b)
Number of intermittent fa				Ľ	4		10 =	40	(7a)
Number of passive vents	ŝ		_		0	X ?	10 =	0	(7b)
Number of flueless gas f	ires				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	evs flues and fans = (6)	a)+(6b)+(7a)+(7	7b)+(7c) =	Г	40		÷ (5) =	0.1	(8)
	been carried out or is intend			ontinue fro			. (0) –	0.1	
Number of storeys in t	he dw <mark>elling</mark> (ns)						[0	(9)
Additional infiltration						[(9)	1]x0.1 =	0	(10)
	0.25 for steel or timber			•	uction	I		0	(11)
if both types of wall are p deducting areas of open	present, use the value corres ings): if equal user 0.35	sponding to the g	greater wall area	a (after					
	floor, enter 0.2 (unsea	led) or 0.1 (s	ealed), else	enter 0			[0	(12)
lf no draught lobby, er	nter 0.05, else enter 0						ĺ	0	(13)
Percentage of window	/s and doors draught s	tripped					[0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	= [00		[0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	· (15) =	[0	(16)
	, q50, expressed in cul	•	•	•	etre of e	nvelope	area	5	(17)
If based on air permeabi	•					1	l	0.35	(18)
Number of sides shelter	es if a pressurisation test ha ed	s been done or i	a degree air per	meability	is being us	ea	I	2	(19)
Shelter factor	50		(20) = 1 - [0.075 x (1	9)] =			0.85	(10)
Infiltration rate incorpora	iting shelter factor		(21) = (18)	x (20) =				0.3	(21)
Infiltration rate modified	for monthly wind spee	d					L		
Jan Feb	Mar Apr May	Jun J	ul Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.	.8 3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	$(2)m \div 4$								
(22a)m = 1.27 1.25	1.23 1.1 1.08	0.95 0.9	95 0.92	1	1.08	1.12	1.18		
· · · · · · · · · · · · · · · · · · ·						-			

Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	peed) =	: (21a) x ((22a)m				_	
	0.38	0.38	0.37	0.33	0.32	0.29	0.29	0.28	0.3	0.32	0.34	0.35		
	<i>ate effec</i> echanica		-	rate for t	he appli	cable ca	se							(23a)
				endix N. (2	3b) = (23a	i) x Fmv (e	auation (I	N5)) , other	wise (23b) = (23a)			0	(23a)
			• • • •		, ,		•	n Table 4h)		, (,			0	(23c)
			-	-	-			, HR) (24a		2h)m + ('	23h) x ['	1 – (23c)	-	(200)
(24a)m=		0		0	0	0	0		0	0	0	0]	(24a)
		d mecha	ı anical ve	entilation	without	heat rec	overv (N	MV) (24b)m = (22	1 2b)m + (;	23b)		I	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If	whole ho	ouse ex	tract ver	tilation o	or positiv	ve input v	ventilatio	on from o	utside	ļ		Į	1	
,					•	•		c) = (22b		.5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,								on from lo						
	r í r		<u> </u>	<u> </u>	<i>.</i>	<u>`</u>	,	0.5 + [(22)]	,	- -			1	
(24d)m=		0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
			i	· · ·		<u> </u>	, ,	d) in box	. ,	0.55	0.50	0.50	1	(25)
(25)m=	0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
3. He	at losses	s and he	at loss	paramete	≏r.									
			1000	saranou	51.									
		Gros	s	Openin	gs	Net Ar		U-valu		AXU		k-value		A X k
ELEN		Gros area	s		gs	A ,n	n²	W/m2	ĸ	(VV/I	<)	k-value kJ/m²·l		kJ/K
ELEN Windo	/IENT ws Type	Gros area 1	s	Openin	gs	A ,n 3.07	n² x1	W/m2 /[1/(1.4)+	K 0.04] =	(W/ł 4.07	<)			kJ/K (27)
ELEN Windov Windov	MENT ws Type ws Type	Gros area 1 2	s	Openin	gs	A ,n 3.07 2.91	n ² x ¹	W/m2 /[1/(1.4)+ /[1/(1.4)+	K 0.04] = 0.04] =	(W/H 4.07 3.86	<)			kJ/K (27) (27)
ELEN Windov Windov Windov	IENT ws Type ws Type ws Type	Gros area 1 2 3	s	Openin	gs	A ,n 3.07 2.91 9.74	n ² x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] =	(W/ł 4.07 3.86 13.78	<)			kJ/K (27) (27) (27)
ELEN Windov Windov Windov	IENT ws Type ws Type ws Type ws Type	Gros area 1 2 3 4	s	Openin	gs	A ,n 3.07 2.91 9.74 2.56	n ² x1 x1 x1 x1 x1	W/m2/ /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 4.07 3.86 13.78 3.62				kJ/K (27) (27) (27) (27)
ELEN Windov Windov Windov Windov	AENT ws Type ws Type ws Type ws Type ws Type	Gros area 1 2 3 4 5	35 (m²)	Openin m	gs ,2	A ,n 3.07 2.91 9.74 2.56 12.3	n ² x1 x1 x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 4.07 3.86 13.78 3.62 17.41				kJ/K (27) (27) (27) (27) (27)
ELEN Windor Windor Windor Windor Windor	IENT ws Type ws Type ws Type ws Type Type1	Gros area 1 2 3 4 5 5	55 5	Openin m 9.05	gs ,2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 4.07 3.86 13.78 3.62 17.41 5.84				kJ/K (27) (27) (27) (27) (27) (29)
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻	ABNT ws Type ws Type ws Type ws Type Type1 Type2	Gros area 1 2 3 4 5	55 5	Openin m 9.05	gs	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4	n ² x1 x1 x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 4.07 3.86 13.78 3.62 17.41 5.84 3.85				kJ/K (27) (27) (27) (27) (27) (27) (29) (29)
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type2 Type3	Gros area 1 2 3 4 5 5	5 5	Openin m 9.05	gs	A ,n 3.07 2.91 9.74 2.56 12.3 32.45	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 4.07 3.86 13.78 3.62 17.41 5.84				kJ/K (27) (27) (27) (27) (27) (29)
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type2 Type3 Type4	Gros area 1 2 3 4 5 5 41.5 21.4	5 4	Openin m 9.05	gs 2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = =	(W/k 4.07 3.86 13.78 3.62 17.41 5.84 3.85				kJ/K (27) (27) (27) (27) (27) (27) (29) (29)
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type2 Type3 Type4	Gros area 1 2 3 4 5 4 5 21.4 16.7	5 (m ²)	Openin m 9.05 0 12.3	gs 2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4 3.8	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/k 4.07 3.86 13.78 3.62 17.41 5.84 3.85 0.68				kJ/K (27) (27) (27) (27) (27) (29) (29) (29)
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type2 Type3 Type4 Type5	Gros area 1 2 3 4 5 4 1.4 5 21.4 16.7 22.2	5 4 2 2	Openin m 9.05 0 12.3 12.3	gs 2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4 3.8 9.9	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/H 4.07 3.86 13.78 3.62 17.41 5.84 3.85 0.68 1.78				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29)
ELEN Windov Windov Windov Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type3 Type3 Type5 Type6	Gros area 1 2 3 4 5 5 21.4 16.7 22.2 14.8	5 4 2 2	Openin m 9.05 0 12.3 12.3 0	gs 2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4 3.8 9.9 14.82	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = =	(W// 4.07 3.86 13.78 3.62 17.41 5.84 3.85 0.68 1.78 2.67				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type3 Type3 Type5 Type6	Gros area 1 2 3 4 5 4 1.5 22.2 14.8 14.8 4.2 15.4	5 (m ²) 5 4 1 2 32 4	Openin m 9.05 0 12.3 12.3 0 0	gs 2	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4 3.8 9.9 14.82 4.2	n ² x1	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W// 4.07 3.86 13.78 3.62 17.41 5.84 3.85 0.68 1.78 2.67 0.76				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29
ELEN Windov Windov Windov Windov Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻ Walls ⁻	AENT ws Type ws Type ws Type ws Type Type1 Type2 Type3 Type5 Type6 Type7 area of el	Gros area 1 2 3 4 5 4 1 5 2 1.4 16.7 22.3 14.8 4.2 15.4 Idements roof window	5 4 1 2 4 4 , m ² bws, use e	Openin 9.05 0 12.3 0 12.3 0 0 0 0 0 0 0	gs 22	A ,n 3.07 2.91 9.74 2.56 12.3 32.45 21.4 3.8 9.9 14.82 4.2 15.4 135.62	n ² x1 x1 x1 x1 x1 x1 x1 x1 x x x x x x x x	W/m2 /[1/(1.4)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ 0.18 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W// 4.07 3.86 13.78 3.62 17.41 5.84 3.85 0.68 1.78 2.67 0.76 2.77		kJ/m²+l		kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	65.16	(33)
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	0	(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 p can be used instead of a detailed calculation.	recisely the indicative values of TMP in Table 1f		_

Thermal bridges : S (L x Y) calculated using Appendix K

	s of therma		are not kn	own (36) =	= 0.15 x (3	1)			()	()				_
	abric he								(33) +	(36) =			71.95	(37)
Ventila	ation hea	at loss ca	alculated	l monthly	y I			r	. ,	= 0.33 × (25)m x (5)	1	1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	72.63	72.26	71.91	70.24	69.93	68.48	68.48	68.21	69.04	69.93	70.56	71.22	J	(38)
Heat t	ransfer c		nt, W/K	i	i	i	i		(39)m	= (37) + (3	38)m	i	,	
(39)m=	144.57	144.21	143.85	142.19	141.87	140.42	140.42	140.15	140.98	141.87	142.5	143.17		
Heat I	oss para	meter (H	HLP), W/	′m²K		-				Average = = (39)m ÷		12 /12=	142.18	(39)
(40)m=	1.07	1.07	1.07	1.06	1.05	1.04	1.04	1.04	1.05	1.05	1.06	1.06		
Numb	er of day	rs in mo	nth (Tab	le 1a)						Average =	Sum(40)1.	12 /12=	1.06	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
					•	•		•	•					
4. W	ater heat	ing ene	rgy requi	irement:								kWh/ye	ear:	
Λεειιο	ned occu	Inancy	N									04	1	(42)
	FA > 13.9			[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		.91	J	(42)
	-A £ 13.9	1												
	al averag									se target o		3.22		(43)
	re that 125	-				-	-		a water at	o larger o				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	t <mark>er u</mark> sage ii							<u> </u>					1	
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	10 <mark>5.28</mark>	109.41	113.54		
			<u> </u>					1		Total = Su	m(44) ₁₁₂ =	=	1238.61	(44)
Energy	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,i	m x nm x L	OTm / 3600) kWh/mor	nth (see Ta	bles 1b, 1	c, 1d)		
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
If instan	tonoouou	ator booti	na of point	of upp (m	botwata	r otorogo)	ontor 0 in	haven (16		Total = Su	m(45) ₁₁₂ =	=	1624.02	(45)
	ntaneous w		- ·	·			r	1	1				1	(12)
(46)m= Water	25.26 storage	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	ge volum) includir	ng any se	olar or W	/WHRS	storage	within sa	ame ves	sel		150]	(47)
If com	munity h	eating a	and no ta	ink in dw	velling, e	nter 110) litres in	ı (47)					1	
Other	wise if no	o stored	hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage													
a) If n	nanufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				1.	65		(48)
Temp	erature fa	actor fro	m Table	2b							0.	54		(49)
-	y lost fro		-	•			1	(48) x (49) =		0.	89		(50)
	nanufact ater stora			•								0	1	(51)
	munity h	-				.,,,	~J /					0]	(01)
	ne factor	-										0]	(52)
Temp	erature fa	actor fro	m Table	2b								0]	(53)
Energ	y lost fro	m water	r storage	, kWh/ye	ear			(47) x (51) x (52) x (53) =		0]	(54)
Enter	(50) or ((54) in (5	55)								0.	89		(55)

Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66]	(57)
Primar	y circuit	loss (an	nual) fro	om Table	93							0		(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor fi	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss ca	culated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	1
(62)m=	219.3	193.26	202.89	181.77	178.05	158.98	152.58	167.57	167.32	188.49	199.44	213.99		(62)
Solar DH	IW input o	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contributi	ion to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or V	WWHRS	applies	, 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=	219.3	193.26	202.89	181.77	178.05	158.98	152.58	167.57	167.32	188.49	199.44	213.99		
								Outp	out from wa	ater heate	r (annual)₁	12	2223.63	(64)
Hea <mark>t g</mark>	ains fro	m water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)n	n] + 0.8 x	(46)m	+ (57)m	+ (59)m	1	
(65)m=	9 <mark>6.73</mark>	85.76	91.27	83.48	83.01	75.9	74.54	79.53	78.67	86.48	89.35	94.96	1	(65)
							1	13.00	10.01	00.40	03.55	94.90		· · ·
inclu	de (57)	m in calo	culation								I		l	~ /
	. ,				only if c						I	munity h	l neating	
5. Int	ernal ga	ains (see	Table 5	of (65)m	only if c						I		 neating	
5. Int	ernal ga		Table 5	of (65)m	only if c						I		 neating	
5. Int	ernal ga olic gain	ains (see s (Table	Table 5 5), Wat	of (65)m and 5a) ts	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	nunity h	leating	(66)
5. Int Metabo (66)m=	ernal ga plic gain Jan 145.3	ains (see s (Table Feb 145.3	Table 5), Wat Mar 145.3	of (65)m 5 and 5a ts Apr	only if c : May 145.3	ylinder is Jun 145.3	s in the o Jul 145.3	dwelling Aug 145.3	or hot w Sep 145.3	ater is fr Oct	om com	munity h	l heating	
5. Int Metabo (66)m=	ernal ga plic gain Jan 145.3	ains (see s (Table Feb 145.3	Table 5), Wat Mar 145.3	of (65)m 5 and 5a ts Apr 145.3	only if c : May 145.3	ylinder is Jun 145.3	s in the o Jul 145.3	dwelling Aug 145.3	or hot w Sep 145.3	ater is fr Oct	om com	munity h	 heating	
5. Int Metabo (66)m= Lightin (67)m=	ernal ga plic gain Jan 145.3 g gains 27.03	ains (see s (Table Feb 145.3 (calcula 24.01	Table 5 5), Wat Mar 145.3 ted in Ap 19.52	of (65)m and 5a ts Apr 145.3 opendix	only if c : May 145.3 L, equati 11.05	Jun 145.3 ion L9 o 9.33	Jul 145.3 r L9a), a 10.08	Aug 145.3 Iso see 13.1	or hot w Sep 145.3 Table 5 17.58	Oct 145.3 22.33	Nov	Dec	 heating	(66)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga plic gain Jan 145.3 g gains 27.03	ains (see s (Table Feb 145.3 (calcula 24.01	Table 5 5), Wat Mar 145.3 ted in Ap 19.52	of (65)m and 5a ts Apr 145.3 opendix 14.78	only if c : May 145.3 L, equati 11.05	Jun 145.3 ion L9 o 9.33	Jul 145.3 r L9a), a 10.08	Aug 145.3 Iso see 13.1	or hot w Sep 145.3 Table 5 17.58	Oct 145.3 22.33	Nov	Dec	 heating	(66)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m=	ernal ga Dic gain Jan 145.3 g gains 27.03 nces ga 303.18	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33	E Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4	of (65)m and 5a ts Apr 145.3 opendix 14.78 Append 281.52	only if c : May 145.3 L, equati 11.05 dix L, eq 260.22	Jun 145.3 ion L9 of 9.33 uation L 240.19	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82	Aug 145.3 Iso see 13.1 3a), also 223.67	or hot w Sep 145.3 Table 5 17.58 see Ta 231.6	ater is fr Oct 145.3 22.33 ble 5 248.48	Nov 145.3 26.06	Dec 145.3 27.78	 heating	(66) (67)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m=	ernal ga Dic gain Jan 145.3 g gains 27.03 nces ga 303.18	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33	E Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4	of (65)m and 5a ts Apr 145.3 opendix 14.78	only if c : May 145.3 L, equati 11.05 dix L, eq 260.22	Jun 145.3 ion L9 of 9.33 uation L 240.19	5 in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82	Aug 145.3 Iso see 13.1 3a), also 223.67	or hot w Sep 145.3 Table 5 17.58 see Ta 231.6	ater is fr Oct 145.3 22.33 ble 5 248.48	Nov 145.3 26.06	Dec 145.3 27.78	l heating	(66) (67)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m=	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ted in A 37.53	of (65)m and 5a ts Apr 145.3 opendix 14.78 Append 281.52 opendix 37.53	only if c : 145.3 L, equati 11.05 dix L, eq 260.22 L, equat	Jun 145.3 ion L9 o 9.33 uation L 240.19 ion L15	Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a)	Aug 145.3 Iso see 13.1 3a), also 223.67), also se	or hot w Sep 145.3 Table 5 17.58 o see Ta 231.6 ee Table	ater is fr Oct 145.3 22.33 ble 5 248.48 5	rom com Nov 145.3 26.06 269.78	Dec 145.3 27.78 289.81	 heating 	(66) (67) (68)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ted in A 37.53	of (65)m and 5a ts Apr 145.3 opendix 14.78 Append 281.52 opendix 37.53	only if c : 145.3 L, equati 11.05 dix L, eq 260.22 L, equat	Jun 145.3 ion L9 o 9.33 uation L 240.19 ion L15	Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a)	Aug 145.3 Iso see 13.1 3a), also 223.67), also se	or hot w Sep 145.3 Table 5 17.58 o see Ta 231.6 ee Table	ater is fr Oct 145.3 22.33 ble 5 248.48 5	rom com Nov 145.3 26.06 269.78	Dec 145.3 27.78 289.81	 heating 	(66) (67) (68)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m=	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in Ap 298.4 ted in A 37.53 (Table 5 3	of (65)m and 5a ts Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 3	only if c : 145.3 L, equati 11.05 dix L, eq 260.22 L, equat 37.53	ylinder is Jun 145.3 ion L9 of 9.33 uation L9 240.19 ion L15 37.53	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53	or hot w Sep 145.3 Table 5 17.58 see Ta 231.6 ee Table 37.53	ateris fr Oct 145.3 22.33 ble 5 248.48 5 37.53	Nov 145.3 26.06 269.78 37.53	Dec 145.3 27.78 289.81 37.53	 heating 	(66) (67) (68) (69)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 s e.g. ev	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3 raporatio	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ted in A 37.53 (Table 5 3 on (nega	of (65)m and 5a ts Apr 145.3 opendix 14.78 14.78 14.78 Appendix 281.52 opendix 37.53 5a) 3 tive valu	only if c : May 145.3 L, equat 11.05 dix L, eq 260.22 L, equat 37.53 3 es) (Tab	ylinder is Jun 145.3 ion L9 of 9.33 uation L9 240.19 ion L15 37.53 3 le 5)	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 3	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 3	or hot w Sep 145.3 Table 5 17.58 5 see Ta 231.6 5 e Table 37.53 3	ate r is fr Oct 145.3 22.33 ble 5 248.48 5 37.53 3	Nov 145.3 26.06 269.78 37.53 3	Dec 145.3 27.78 289.81 37.53 3	l eating	(66) (67) (68) (69)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal ga plic gain 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 e.g. ev -116.24	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3 aporatio -116.24	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ited in A 37.53 (Table 5 3 on (nega -116.24	of (65)m and 5a ts Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 3	only if c : 145.3 L, equati 11.05 dix L, eq 260.22 L, equat 37.53	ylinder is Jun 145.3 ion L9 of 9.33 uation L9 240.19 ion L15 37.53	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53	or hot w Sep 145.3 Table 5 17.58 5 see Ta 231.6 5 e Table 37.53 3	ateris fr Oct 145.3 22.33 ble 5 248.48 5 37.53	Nov 145.3 26.06 269.78 37.53	Dec 145.3 27.78 289.81 37.53	leating	 (66) (67) (68) (69) (70)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 e.g. ev -116.24 heating	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3 aporatio -116.24 gains (T	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ted in A 37.53 (Table 5 3 on (nega -116.24	of (65)m and 5a ts Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 3 tive valu -116.24	only if c : May 145.3 L, equati 11.05 dix L, equati 260.22 L, equati 37.53 3 es) (Tab -116.24	ylinder is Jun 145.3 ion L9 o 9.33 uation L 240.19 ion L15 37.53 3 le 5) -116.24	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 3 -116.24	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 3 -116.24	or hot w Sep 145.3 Table 5 17.58 231.6 ee Table 37.53 3 -116.24	ate r is fr Oct 145.3 22.33 ble 5 248.48 5 37.53 3 -116.24	Nov 145.3 26.06 269.78 37.53 3 -116.24	Dec 145.3 27.78 289.81 37.53 3 -116.24	l eating	 (66) (67) (68) (69) (70) (71)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 e.g. ev -116.24 heating 130.01	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3 raporatio -116.24 gains (T 127.62	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ited in A 37.53 (Table 5 3 on (nega -116.24 Table 5) 122.67	of (65)m and 5a ts Apr 145.3 opendix 14.78 14.78 14.78 Appendix 281.52 opendix 37.53 5a) 3 tive valu	only if c : May 145.3 L, equat 11.05 dix L, eq 260.22 L, equat 37.53 3 es) (Tab	ylinder is Jun 145.3 ion L9 of 9.33 uation L9 240.19 ion L15 37.53 3 le 5) -116.24 105.42	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 3 -116.24 100.19	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 3 -116.24 106.89	or hot w Sep 145.3 Table 5 17.58 5 see Ta 231.6 5 e Table 37.53 3 -116.24 109.27	ate r is fr Oct 145.3 22.33 ble 5 248.48 5 37.53 3 -116.24 116.24	Nov 145.3 26.06 269.78 37.53 3 -116.24 124.1	Dec 145.3 27.78 289.81 37.53 3 -116.24 127.63	leating	 (66) (67) (68) (69) (70)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 e.g. ev -116.24 heating 130.01 nternal	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 ns gains 3 aporatio -116.24 gains (T 127.62 gains =	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in Ap 298.4 ited in Ap 37.53 (Table 5 3 on (negat -116.24 Table 5) 122.67	of (65)m and 5a ts Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 3 tive valu -116.24	only if c : May 145.3 L, equati 11.05 dix L, equati 260.22 L, equati 37.53 3 es) (Tab -116.24 111.57	ylinder is Jun 145.3 ion L9 of 9.33 uation L 240.19 ion L15 37.53 3 le 5) -116.24 105.42 (66)	s in the c Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 3 -116.24 100.19 m + (67)m	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 3 -116.24 106.89	or hot w Sep 145.3 Table 5 17.58 5 see Ta 231.6 231.6 231.6 37.53 3 -116.24 109.27 + (69)m + (ate r is fr Oct 145.3 22.33 ble 5 248.48 5 37.53 3 -116.24 116.24 70)m + (7	rom com Nov 145.3 26.06 269.78 37.53 3 -116.24 124.1 1)m + (72)	munity h Dec 145.3 27.78 289.81 37.53 3 -116.24 127.63 m	l eating	 (66) (67) (68) (69) (70) (71) (72)
5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i (73)m=	ernal ga plic gain Jan 145.3 g gains 27.03 nces ga 303.18 ng gains 37.53 and fai 3 e.g. ev -116.24 heating 130.01	ains (see s (Table Feb 145.3 (calcula 24.01 ins (calc 306.33 (calcula 37.53 (calcula 37.53 ns gains 3 raporatio -116.24 gains (T 127.62 gains = 527.55	Table 5 5), Wat Mar 145.3 ted in Ap 19.52 ulated in 298.4 ited in A 37.53 (Table 5 3 on (nega -116.24 Table 5) 122.67	of (65)m and 5a ts Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 3 tive valu -116.24	only if c : May 145.3 L, equati 11.05 dix L, equati 260.22 L, equati 37.53 3 es) (Tab -116.24	ylinder is Jun 145.3 ion L9 of 9.33 uation L9 240.19 ion L15 37.53 3 le 5) -116.24 105.42	s in the o Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 3 -116.24 100.19	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 3 -116.24 106.89	or hot w Sep 145.3 Table 5 17.58 5 see Ta 231.6 5 e Table 37.53 3 -116.24 109.27	ate r is fr Oct 145.3 22.33 ble 5 248.48 5 37.53 3 -116.24 116.24	Nov 145.3 26.06 269.78 37.53 3 -116.24 124.1	Dec 145.3 27.78 289.81 37.53 3 -116.24 127.63	leating	 (66) (67) (68) (69) (70) (71)

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

Orientatior		Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North 0	.9x	0.77	x	12.3	x	10.63	x	0.63	x	0.7	=	39.97	(74)
North 0	.9x	0.77	x	12.3	x	20.32	x	0.63	x	0.7	=	76.39	(74)
North 0	.9x	0.77	x	12.3	x	34.53	x	0.63	x	0.7	=	129.8	(74)
North 0	.9x	0.77	x	12.3	x	55.46	x	0.63	x	0.7	=	208.49	(74)
North 0	.9x	0.77	x	12.3	x	74.72	x	0.63	x	0.7	=	280.86	(74)
North 0	.9x	0.77	x	12.3	x	79.99	x	0.63	x	0.7	=	300.67	(74)
North 0	.9x	0.77	x	12.3	x	74.68	x	0.63	x	0.7	=	280.71	(74)
North 0	.9x	0.77	x	12.3	x	59.25	x	0.63	x	0.7	=	222.71	(74)
North 0	.9x	0.77	x	12.3	x	41.52	x	0.63	x	0.7	=	156.06	(74)
North 0	.9x	0.77	x	12.3	x	24.19	x	0.63	x	0.7	=	90.93	(74)
North 0	.9x	0.77	x	12.3	x	13.12	x	0.63	x	0.7	=	49.31	(74)
North 0	.9x	0.77	x	12.3	x	8.86	x	0.63	x	0.7	=	33.32	(74)
East 0	.9x	2	x	3.07	x	19.64	x	0.63	x	0.7	=	36.85	(76)
East 0	.9x	1	x	2.91	×	19.64	x	0.63	x	0.7	=	17.47	(76)
East 0	.9x	2	x	3.07	x	38.42	x	0.63	x	0.7	=	72.09	(76)
East 0	.9x	1	x	2.91	×	38.42	х	0.63	x	0.7	=	34.17	(76)
East 0	.9x	2	x	3.07	x	63.27	x	0.63	x	0.7	=	118.73	(76)
East 0	.9x	1	x	2.91	x	63.27	×	0.63	x	0.7	=	56.27	(76)
East 0	.9x	2	x	3.07	x	92.28	x	0.63	x	0.7	=	173.16	(76)
East 0	.9x	1	x	2.91	×	92.28	х	0.63	x	0.7	=	82.07	(76)
East 0	.9x	2	x	3.07	x	113.09	×	0.63	x	0.7	=	2 <mark>12.21</mark>	(76)
East 0	.9x	1	x	2.91	x	113.09	x	0.63	x	0.7	=	100.58	(76)
East 0	.9x	2	x	3.07	x	115.77	x	0.63	x	0.7	=	217.24	(76)
East 0	.9x	1	x	2.91	x	115.77	x	0.63	x	0.7	=	102.96	(76)
East 0	.9x	2	x	3.07	x	110.22	x	0.63	x	0.7	=	206.82	(76)
East 0	.9x	1	x	2.91	x	110.22	x	0.63	x	0.7	=	98.02	(76)
East 0	.9x	2	x	3.07	x	94.68	x	0.63	x	0.7	=	177.66	(76)
East 0	.9x	1	x	2.91	x	94.68	x	0.63	x	0.7	=	84.2	(76)
East 0	.9x	2	x	3.07	×	73.59	x	0.63	x	0.7	=	138.09	(76)
East 0	.9x	1	x	2.91	×	73.59	x	0.63	x	0.7	=	65.45	(76)
East 0	.9x	2	x	3.07	×	45.59	x	0.63	x	0.7	=	85.55	(76)
East 0	.9x	1	x	2.91	×	45.59	x	0.63	x	0.7	=	40.54	(76)
East 0	.9x	2	x	3.07	x	24.49	x	0.63	x	0.7	=	45.95	(76)
East 0	.9x	1	x	2.91	×	24.49	x	0.63	x	0.7	=	21.78	(76)
East 0	.9x	2	x	3.07	x	16.15	x	0.63	x	0.7	=	30.31	(76)
	.9x	1	x	2.91	x	16.15	x	0.63	x	0.7	=	14.36	(76)
	.9x	0.77	x	9.74	×	46.75	x	0.63	x	0.7	=	139.17	(78)
	.9x	0.77	x	2.56	×	46.75	x	0.63	x	0.7	=	36.58	(78)
South 0	.9x	0.77	x	9.74	×	76.57	x	0.63	x	0.7	=	227.92	(78)

South 0.8x 0.77 x 2.56 x 77.57 x 0.63 x 0.7 = 59.9 (78) South 0.6x 0.77 x 2.56 x 77.57 x 0.63 x 0.7 = 77.31 (78) South 0.9x 0.77 x 2.56 x 110.23 x 0.63 x 0.7 = 77.31 (78) South 0.9x 0.77 x 2.56 x 110.23 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 114.27 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 110.55 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 110.55 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 110.55 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 10.95 x 0.63 x 0.7 = 68.24 (78) South 0.9x 0.77 x 2.56 x 10.80 x 0.63 x 0.7 = 68.27 (78) South 0.9x 0.77 x 0.74 x 10.58 x 0.63 x 0.7 = 68.27 (78) South 0.9x 0.77 x 2.66 x 10.189 x 0.63 x 0.7 = 79.71 (78) South 0.9x 0.77 x 2.66 x 10.189 x 0.63 x 0.7 = 70.71 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 0.74 x 2.55 x 2.5 2.7 0.33 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 0.74 x 2.55 x 2.5 0.78 74.7 2.55 x 0.7 = 74.51 (78) South 0.9x 0.77 x 2.56 x 2.55 x 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 0.74 x 2.55 x 2.55 2.2 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 0.74 x 2.55 x 2.55 2.2 0.63 x 0.7 = 74.51 (78) South 0.9x 0.77 x 0.74 x 2.55 x 2.55	0 11	г							-		_				_	
South 0.9 0.77 × 2.66 × 0.73 × 0.63 × 0.77 × 2.66 × 0.73 × 0.63 × 0.77 × 2.26 × 110.23 × 0.63 × 0.77 × 2.26 × 110.23 × 0.63 × 0.77 × 2.26 × 110.23 × 0.63 × 0.77 × 2.266 × 111.477 × 0.63 × 0.77 × 2.266 × 111.487 × 0.63 × 0.77 × 2.86 × 110.55 × 0.63 × 0.77 × 2.86 × 110.55 × 0.63 × 0.77 × 2.86 × 110.55 × 0.63 × 0.77 × 2.86 × 110.55 × 0.63 × 0.77 × 2.86 × 110.88 0.63 × 0.77 = 2.215 (78) South 0.93 0.77 2.26 × <th< td=""><td>South</td><td>0.9x</td><td>0.77</td><td>×</td><td>2.56</td><td>5</td><td>x</td><td>76.57</td><td>_ ×</td><td>0.63</td><td>×</td><td>0.7</td><td>=</td><td>59.9</td><td>(78)</td></th<>	South	0.9x	0.77	×	2.56	5	x	76.57	_ ×	0.63	×	0.7	=	59.9	(78)	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		0.9x	0.77	×	9.74	<u>ا</u>	x	97.53	×	0.63	×	0.7	=	290.33	(78)	
South 0.0.7 × 2.56 × 10.023 × 0.63 × 0.77 = 66.24 (%) South 0.37 × 2.56 × 114.87 × 0.63 × 0.77 = 66.24 (%) South 0.32 0.77 × 2.56 × 114.87 × 0.63 × 0.77 = 289.87 (%) South 0.32 0.77 × 2.56 × 110.55 × 0.63 × 0.77 = 289.87 (%) South 0.32 0.77 × 2.56 × 100.61 × 0.63 × 0.77 = 322.42 (%) South 0.32 0.77 × 2.56 × 104.89 × 0.63 × 0.77 = 322.47 (%) South 0.32 0.77 × 2.56 × 104.89 × 0.63 × 0.77 = 245.83 (%) 0.63 × 0.77 =<		0.9x	0.77	×	2.56	5	x	97.53	×	0.63	×	0.7	=	76.31	(78)	
South 0.9×0.77 × 0.74 × 114.87 × 0.63 × 0.7 = 341.93 (78) South 0.9×0.77 × 2.56 × 114.87 × 0.63 × 0.7 = 329.66 (78) South 0.9×0.77 × 0.74 × 110.55 × 0.63 × 0.7 = 329.66 (78) South 0.9×0.77 × 0.74 × 110.55 × 0.63 × 0.7 = 329.66 (78) South 0.9×0.77 × 0.74 × 110.55 × 0.63 × 0.7 = 329.66 (78) South 0.9×0.77 × 0.74 × 106.01 × 0.63 × 0.7 = 324.52 (78) South 0.9×0.77 × 0.74 × 106.01 × 0.63 × 0.7 = 324.52 (78) South 0.9×0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 312.24 (78) South 0.9×0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 322.42 (78) South 0.9×0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 322.42 (78) South 0.9×0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 322.42 (78) South 0.9×0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 322.42 (78) South 0.9×0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 322.42 (78) South 0.9×0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 322.46 (78) South 0.9×0.77 × 0.74 × 2.56 × 542 × 0.63 × 0.7 = 42.67 (78) South 0.9×0.77 × 0.74 × 2.56 × 542 × 0.63 × 0.7 = 44.51 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 44.56 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 44.56 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 44.56 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = $14.64.96$ (74) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 2.56 × 542 × 0.63 × 0.7 = 120.25 (78) South 0.9×0.77 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7 × 0.7	South	0.9x	0.77	x	9.74	Ļ	x	110.23	×	0.63	x	0.7	=	328.13	(78)	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	South	0.9x	0.77	×	2.56	6	x	110.23	x	0.63	×	0.7	=	86.24	(78)	
South $0.9x$ 0.77 \times 0.74 \times 110.55 \times 0.63 \times 0.7 $=$ 329.06 (78) South $0.9x$ 0.77 \times 2.56 \times 110.55 \times 0.63 \times 0.7 $=$ 321.52 (78) South $0.9x$ 0.77 \times 0.74 \times 108.01 \times 0.63 \times 0.7 $=$ 321.52 (79) South $0.9x$ 0.77 \times 2.56 \times 100.01 \times 0.63 \times 0.7 $=$ 321.52 (79) South $0.9x$ 0.77 \times 2.56 \times 104.89 \times 0.63 \times 0.7 $=$ 321.52 (79) South $0.9x$ 0.77 \times 2.56 \times 104.89 \times 0.63 \times 0.7 $=$ 321.224 (79) South $0.9x$ 0.77 \times 2.56 \times 104.89 \times 0.63 \times 0.7 $=$ 322.26 (78) South $0.9x$ 0.77 \times 2.56 \times 104.89 \times 0.63 \times 0.7 $=$ 303.28 (78) South $0.9x$ 0.77 \times 2.56 \times 101.89 \times 0.63 \times 0.7 $=$ 79.71 (78) South $0.9x$ 0.77 \times 2.56 \times 101.89 \times 0.63 \times 0.7 $=$ 245.63 (78) South $0.9x$ 0.77 \times 2.56 \times 101.89 \times 0.63 \times 0.7 $=$ 245.63 (78) South $0.9x$ 0.77 \times 2.56 \times 25.94 \times 0.63 \times 0.7 $=$ 245.63 (78) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.41 (79) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.41 (78) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.45 (78) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.38 (78) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.38 (78) South $0.9x$ 0.77 \times 2.56 \times 25.642 \times 0.63 \times 0.7 $=$ 43.45 (78) South $0.9x$ 0.77 \times 2.56 \times $2.56.42$ \times 0.63 \times 0.7 $=$ 142.92 (78) South $0.9x$ 0.77 \times 2.56 \times $2.56.42$ \times 0.63 \times 0.7 $=$ 120.25 (78) South $0.9x$ 0.77 \times 2.56 \times $2.56.42$ \times 0.63 \times 0.7 $=$ 120.25 (78) South $0.9x$ 0.77 \times 2.56 \times $2.56.42$ \times 0.63 \times 0.7 $=$ 120.25 (78) South $0.9x$ 0.77 \times 2.56 \times $2.56.42$ \times 0.63 \times 0.7 $=$ 120.25 (78) South $0.9x$ 0.77 \times 0.77 \times 0.77 0.7 0.7 0.7 0.7 0.65 $0.7.46$ 0.7 0.7 0.6 (79) Solar ga	South	0.9x	0.77	x	9.74	Ļ	x	114.87	×	0.63	x	0.7	=	341.93	(78)	
South 0.9, 0.77 × 0.74 × 108.01 × 0.63 × 0.7 = 88.49 (78) South 0.9, 0.77 × 0.74 × 108.01 × 0.63 × 0.7 = 821.52 (78) South 0.9, 0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 82.152 (78) South 0.9, 0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 82.07 (78) South 0.9, 0.77 × 0.74 × 104.89 × 0.63 × 0.7 = 82.07 (78) South 0.9, 0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.9, 0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.9, 0.77 × 0.74 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.9, 0.77 × 0.74 × 82.59 × 0.63 × 0.7 = 79.71 (78) South 0.9, 0.77 × 0.74 × 82.59 × 0.63 × 0.7 = 74.71 (78) South 0.9, 0.77 × 0.74 × 82.59 × 0.63 × 0.7 = 74.71 (78) South 0.9, 0.77 × 0.74 × 82.59 × 0.63 × 0.7 = 74.71 (78) South 0.9, 0.77 × 0.74 × 82.59 × 0.63 × 0.7 = 74.71 (78) South 0.9, 0.77 × 0.74 × 0.74 × 64.54 (78) South 0.9, 0.77 × 0.74 × 0.74 × 64.54 (78) South 0.9, 0.77 × 0.74 × 0.74 × 64.54 (78) South 0.9, 0.77 × 0.74 × 0.74 × 64.54 (78) South 0.9, 0.77 × 2.56 × 65.42 × 0.63 × 0.7 = 74.36 (78) South 0.9, 0.77 × 2.56 × 0.54 × 0.63 × 0.7 = 74.36 (78) South 0.9, 0.77 × 2.56 × 0.54 × 0.63 × 0.7 = 74.06 (78) South 0.9, 0.77 × 2.56 × 0.54 × 0.63 × 0.7 = 74.06 (78) South 0.9, 0.77 × 2.56 × 0.54 × 0.63 × 0.7 = 74.06 (78) South 0.9, 0.77 × 2.56 × 0.54 × 0.63 × 0.7 = 74.06 (78) South 0.9, 0.77 × 0.74 × 0.74 × 0.64 91.57 878.37 (42.58) 5.27.46 92.53 2.29.85 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (49)m 799.88 99.02 1181.62 1359.93 1477.88 1460.96 139.82 129.212 1170.63 984.99 814.89 744.66 (84) 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) (80m 1 0.99 0.93 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (66) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9.C (77m 19.86 20.06 20.34 20.67 20.89 20.98 21 20.99 20.94 20.62 20.17 19.82 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (89m 1 0.99 0.97	South	0.9x	0.77	x	2.56	6	x	114.87	x	0.63	x	0.7	=	89.87	(78)	
South 0.8 0.77 x 0.74 x 108.01 x 0.63 x 0.77 = 321.62 (78) South 0.9 0.77 x 2.56 x 108.01 x 0.63 x 0.77 = 321.62 (78) South 0.9 0.77 x 2.56 x 104.89 x 0.63 x 0.77 = 322.42 (78) South 0.9 0.77 x 2.56 x 104.89 x 0.63 x 0.77 = 302.28 (78) South 0.9 0.77 x 2.56 x 101.89 x 0.63 x 0.77 = 245.83 (78) South 0.9 0.77 x 2.56 x 105.42 x 0.63 x 0.77 = 245.83 (78) South 0.9 0.77 x 2.56 x 0.63 x 0.77 = 31.84 (78) South 0.8 0.77 = <td< td=""><td>South</td><td>0.9x</td><td>0.77</td><td>x</td><td>9.74</td><td>Ļ</td><td>x</td><td>110.55</td><td>x</td><td>0.63</td><td>x</td><td>0.7</td><td>=</td><td>329.06</td><td>(78)</td></td<>	South	0.9x	0.77	x	9.74	Ļ	x	110.55	x	0.63	x	0.7	=	329.06	(78)	
South 0.94 0.77 × 2.56 × 100.01 × 0.63 × 0.7 = 64.61 (78) South 0.94 0.77 × 2.56 × 104.89 × 0.63 × 0.7 = 312.24 (78) South 0.94 0.77 × 2.56 × 104.89 × 0.63 × 0.7 = 303.28 (78) South 0.94 0.77 × 2.56 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.94 0.77 × 2.56 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.94 0.77 × 2.56 × 101.89 × 0.63 × 0.7 = 79.71 (78) South 0.94 0.77 × 2.56 × 0.256 × 0.33 × 0.7 = 74.61 (78) South 0.94 0.77 × 2.56 × 0.256 × 0.63 × 0.7 = 64.61 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 64.61 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.36 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 43.38 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.04 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.04 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.04 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.542 × 0.63 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.54 (0.44 × 0.66 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.54 (0.44 × 0.66 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.54 (0.44 × 0.66 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.54 (0.44 × 0.66 × 0.7 = 44.06 (78) South 0.94 0.77 × 2.56 × 0.50 (78) (74) (75) (78) (8)m 10.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (6)m 10.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (6)m 10.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (6)m 10.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (6)m 10.99 0.97 0.9 0.74 0.52 0.55 0.39 0.94 0.94 0.99 1 (6)m 10.99 0.97 0.9 0.74 0.52 0.55 0.39 0.94 0.94 0.99 1	South	0.9x	0.77	x	2.56	5	x	110.55	x	0.63	x	0.7	=	86.49	(78)	
South 0.9x 0.77 x 9.74 x 101.89 x 0.63 x 0.7 = 312.24 (78) South 0.9x 0.77 x 2.56 x 104.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 79.71 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 79.71 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 424.53 (78) South 0.9x 0.77 x 2.56 x 0.53 x 0.7 = 444.61 (78) South 0.9x 0.77 x 2.56 x 0.53 x 0.7 = 64.61 (78) South 0.9x 0.77 x 2.56 x 0.53 x 0.7 = 64.61 (78) South 0.9x 0.77 x 2.56 x 0.542 x 0.63 x 0.7 = 43.56 (78) South 0.9x 0.77 x 2.56 x 0.542 x 0.63 x 0.7 = 43.56 (78) South 0.9x 0.77 x 2.56 x 0.542 x 0.63 x 0.7 = 43.56 (78) South 0.9x 0.77 x 2.56 x 0.42 99 57 87.87 (74.58 2.59) x 0.63 x 0.7 = 43.56 (78) South 0.9x 0.77 x 2.56 x 0.42 99 57 87.87 (74.58 2.57 6.8 2.53 2.58 2.59.8 (83) South 0.9x 0.77 x 2.56 x 0.40 4 x 0.63 x 0.7 = 43.56 (78) South 0.9x 0.77 x 2.56 x 0.40 4 x 0.63 x 0.7 = 43.66 (78) South 0.9x 0.77 x 2.56 x 0.41 (78) x 0.63 x 0.7 = 43.66 (78) South 0.9x 0.77 x 2.56 x 0.41 (78) x 0.63 x 0.7 = 43.66 (78) South 0.9x 0.77 x 2.56 x 0.40 4 x 0.63 x 0.7 = 43.66 (78) South 0.9x 0.77 x 2.56 x 0.51 (78) South 0.9x 0.77 x 2.56 x 0.41 (79) x (83)m = Sum(74)m(82)m (83)m 27.04 470.47 671.43 87.81 10.54.61 136.82 199.5 7 87.87 (74.58 5.27.64 3.25.36 2.29.85 (83) Total gains - internal and solar (84)m = (73)m + (83)m x atis (84)m 79.85 98.02 1181.62 135.98 1347.78 140.95 139.25 129.12 1170.63 98.09 81.69 74.66 (84) 7. Mean internal temperature (neating 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) (87)m 19.86 20.06 20.34 20.67 20.89 20.79 0.6 0.44 0.49 0.76 0.96 1 1 1 (86)m 1 0.99 0.93 0.90 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (88) Utilisation factor for gains for rest of dwelling, from Table 9, Th2 (°C) (89)m 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m 18.49 18.79 19.2 19.66 19.9	South	0.9x	0.77	x	9.74	ŀ	x	108.01	×	0.63	x	0.7	=	321.52	(78)	
South 0.07 x 2.56 x 104.89 x 0.63 x 0.7 = 62.07 (78) South 0.9x 0.77 x 9.74 x 101.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 82.59 x 0.63 x 0.7 = 245.83 (78) South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 245.83 (78) South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 43.36 (78) South 0.9x 0.77 x 2.56 x 56.42 x 0.63 x 0.7 = 43.36 (78) South 0.9x	South	0.9x	0.77	x	2.56	6	x	108.01	×	0.63	x	0.7	=	84.51	(78)	
South 0.0x 0.77 x 9.74 x 101.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 303.28 (78) South 0.9x 0.77 x 2.56 x 82.59 x 0.63 x 0.7 = 245.83 (78) South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 44.61 (78) South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 43.36 (79) South 0.9x 0.77 x 2.56 x 56.42 x 0.63 x 0.7 = 43.36 (79) 50.53.2 2	South	0.9x	0.77	x	9.74	Ļ	x	104.89	×	0.63	x	0.7	=	312.24	(78)	
South 0.5x 0.77 x 2.56 x 101.89 x 0.63 x 0.7 = 79.71 (75) South 0.9x 0.77 x 9.74 x 82.59 x 0.63 x 0.7 = 245.83 (76) South 0.9x 0.77 x 9.74 x 55.42 x 0.63 x 0.7 = 245.83 (78) South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 43.36 (78) South 0.9x 0.77 x 2.56 x 40.4 x 0.63 x 0.7 = 43.36 (78) South 0.9x 0.77 x 2.56 x 40.4 x 0.63 x 0.7 = 120.25 (78) South 0.9x 0.77 x 2.56 x 40.4 x 0.63 x 0.7 = 31.61 (78) 62.67.46 325.36	South	0.9x	0.77	x	2.56	5	x	104.89	×	0.63	x	0.7	=	82.07	(78)	
South 0.3x 0.77 × 9.74 × 82.59 × 0.63 × 0.77 = 245.83 (76) South 0.3x 0.77 × 2.56 × 82.59 × 0.63 × 0.77 = 64.61 (77) South 0.3x 0.77 × 2.56 × 55.42 × 0.63 × 0.77 = 64.61 (78) South 0.3x 0.77 × 2.56 × 55.42 × 0.63 × 0.77 = 43.35 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 43.35 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 43.35 (78) 80.63 × 0.77 = 43.35 (78) 80.63 × 0.77 = 31.61 (78) 633 × 0.77 2.56 × <td>South</td> <td>0.9x</td> <td>0.77</td> <td>x</td> <td>9.74</td> <td>Ļ</td> <td>x</td> <td>101.89</td> <td>×</td> <td>0.63</td> <td>x</td> <td>0.7</td> <td>=</td> <td>303.28</td> <td>(78)</td>	South	0.9x	0.77	x	9.74	Ļ	x	101.89	×	0.63	x	0.7	=	303.28	(78)	
South 0.9 0.77 x 2.56 x 82.59 x 0.63 x 0.7 = 64.61 (7) South 0.9 0.77 x 2.56 x 82.59 x 0.63 x 0.7 = 64.61 (7) South 0.9 0.77 x 2.56 x 55.42 x 0.63 x 0.7 = 64.61 (7) South 0.9 0.77 x 2.56 x 40.4 x 0.63 x 0.7 = 120.25 (78) South 0.9 0.77 x 2.56 + 40.4 x 0.63 x 0.7 = 120.25 (78) South 0.9 0.77 x 2.56 + 40.4 x 0.63 x 0.7 = 120.25 (78) Solar gains internal temportation for 1.43 876.1 1026.42 91.57 787.87 742.55 52.74.8 325.36 229.85 (83) Tota	South	0.9x	0.77	x	2.56	;	x	101.89	×	0.63	×	0.7	=	79.71	(78)	
Out × Out OUT Colspan="2">Out OUT Colspan="2">Out OUT OUT South OUT × OUT OUT South OUT × OUT OUT South OUT South OUT South OUT × OUT OUT <th cols<="" td=""><td>South</td><td>0.9x</td><td>0.77</td><td>x</td><td>9.74</td><td></td><td>x</td><td>82.59</td><td>- x</td><td>0.63</td><td>x</td><td>0.7</td><td>=</td><td>245.83</td><td>(78)</td></th>	<td>South</td> <td>0.9x</td> <td>0.77</td> <td>x</td> <td>9.74</td> <td></td> <td>x</td> <td>82.59</td> <td>- x</td> <td>0.63</td> <td>x</td> <td>0.7</td> <td>=</td> <td>245.83</td> <td>(78)</td>	South	0.9x	0.77	x	9.74		x	82.59	- x	0.63	x	0.7	=	245.83	(78)
South 0.9x 0.77 x 2.56 x 55.42 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 9.74 x 40.4 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 2.56 40.4 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 2.56 40.4 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 2.56 40.4 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 2.56 40.4 x 0.63 x 0.77 = 43.36 (78) South 0.9x 0.77 x 2.56 10.4 40.4 x 0.63 x 0.77 = 43.36 (78) South 10.9x 11.52 173	South	0.9x	0.77	x	2.56	;	x	82.59	×	0.63	×	0.7	=	64.61	(78)	
South 0.9x 0.77 × 9.74 × 40.4 × 0.63 × 0.77 = 120.25 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 120.25 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 120.25 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 120.25 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 31.61 (78) South 0.9x 0.77 × 2.56 × 40.4 × 0.63 × 0.77 = 31.61 (78) G8)m= 710.47 671.43 874.1 1025.46 1096.42 91.57 876.87 742.59 527.46 325.36 29.85 (84) 1	Sout <mark>h</mark>	0.9x	0.77	x	9.74		x	55.42	x	0.63	x	0.7	=	164.96	(78)	
Note of the term of term o	Sout <mark>h</mark>	0.9x	0.77	× ۲	2.56	;	x	55.42	1 ×	0.63	x	0.7	=	43.36	(78)	
Solar gains in watts, calculated for each month (83)m = 5um(74)m (82)m (83)m = 270.04 470.47 671.43 878.11 1025.46 1036.42 991.57 878.87 742.58 527.46 325.36 229.85 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) Chean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (86)m 1 0.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (87)m 19.82 (87)m 19.82 (87)m (87)m (86) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (87)m 19.82 (87) (87) (87) Mar Apr May Jun Jul Aug Sep Oct Nov Dec 0.96 1 1 (86)	South	0.9x	0.77	×	9.74	L .	x	40.4	ī 🔨	0.63	x	0.7	=	120.25	(78)	
(83)n= 270.04 470.47 671.43 878.1 1025.46 1086.42 991.57 878.87 742.59 527.46 325.36 229.85 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) Colspan=10: Colspan=10: (84)m = (73)m + (83)m , watts (84)m = 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) 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) (86)m= 1 0.99 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (87)m 1 1.0.99 0.97 20.99 20.94 20.62 20.17 1.9.82 </td <td>Sout<mark>h</mark></td> <td>0.9x</td> <td>0.77</td> <td>×</td> <td>2.56</td> <td>;</td> <td>x</td> <td>40.4</td> <td></td> <td>0.63</td> <td>x</td> <td>0.7</td> <td>=</td> <td>31.61</td> <td>(78)</td>	Sout <mark>h</mark>	0.9x	0.77	×	2.56	;	x	40.4		0.63	x	0.7	=	31.61	(78)	
(83)n= 270.04 470.47 671.43 878.1 1025.46 1086.42 991.57 878.87 742.59 527.46 325.36 229.85 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) Colspan=10: Colspan=10: (84)m = (73)m + (83)m , watts (84)m = 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) 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) (86)m= 1 0.99 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (87)m 1 1.0.99 0.97 20.99 20.94 20.62 20.17 1.9.82 </td <td></td> <td></td> <td></td> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				7					-							
(83)n= 270.04 470.47 671.43 878.1 1025.46 1086.42 991.57 878.87 742.59 527.46 325.36 229.85 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) Colspan=10: Colspan=10: (84)m = (73)m + (83)m , watts (84)m = 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) 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) (86)m= 1 0.99 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (87)m 1 1.0.99 0.97 20.99 20.94 20.62 20.17 1.9.82 </td <td>Solar g</td> <td>ains in</td> <td>watts, calo</td> <td>culated</td> <td>for each</td> <td>month</td> <td></td> <td></td> <td>(83)m</td> <td>n = Sum(74)m</td> <td>(82)m</td> <td></td> <td></td> <td></td> <td></td>	Solar g	ains in	watts, calo	culated	for each	month			(83)m	n = Sum(74)m	(82)m					
(84)m= 799.85 998.02 1181.62 1359.93 1477.88 1460.95 1398.25 1292.12 1170.63 984.09 814.89 744.66 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (86)m= 1 0.99 0.98 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.86 20.06 20.34 20.67 20.98 21 20.99 20.94 20.62 20.17 19.82 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.02 20.03 20.04 20.05 20.05 20.04 20.03 20.03 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.9	(83)m=	270.04	470.47	671.43	878.1	1025.46	10	36.42 991.57	878	.87 742.59	527.4	325.36	229.85		(83)	
Column (1) Column (1) </td <td>Total g</td> <td>ains – i</td> <td>nternal and</td> <td>d solar</td> <td>(84)m =</td> <td>(73)m ·</td> <td>+ (8</td> <td>33)m, watts</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Total g	ains – i	nternal and	d solar	(84)m =	(73)m ·	+ (8	33)m, watts								
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) (86)m= 1 0.99 0.98 0.02 Nov Dec (86)m= 1 0.99 0.98 0.79 0.6 0.44 0.49 0.76 0.96 1 1 0.99 0.98 0.02 Nov Dec (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) Mar Apr May Jun Jul Aug Oct Nov Dec (86) Mar Apr May Jun Jul Aug Oct Oct <td>(84)m=</td> <td>799.85</td> <td>998.02 1</td> <td>181.62</td> <td>1359.93</td> <td>1477.88</td> <td>14</td> <td>60.95 1398.25</td> <td>1292</td> <td>2.12 1170.63</td> <td>984.0</td> <td>9 814.89</td> <td>744.66</td> <td></td> <td>(84)</td>	(84)m=	799.85	998.02 1	181.62	1359.93	1477.88	14	60.95 1398.25	1292	2.12 1170.63	984.0	9 814.89	744.66		(84)	
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) (86)m= 1 0.99 0.92 0.79 0.6 0.44 0.49 0.76 0.96 1 1 (86) Mar Apr May Jun Jul Aug Colspan="4">0.76 0.96 1 (86) (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89) Cols 0.96 <th colsp<="" td=""><td>7. Mea</td><td>an inter</td><td>nal tempe</td><td>rature</td><td>(heating :</td><td>season</td><td>)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>7. Mea</td> <td>an inter</td> <td>nal tempe</td> <td>rature</td> <td>(heating :</td> <td>season</td> <td>)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	7. Mea	an inter	nal tempe	rature	(heating :	season)								
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							·	area from Ta	ble 9	, Th1 (°C)				21	(85)	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Utilisa	tion fac	tor for gain	ns for l	iving area	a, h1,m	(S	ee Table 9a)								
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) $(87)m=$ 19.8620.0620.3420.6720.8920.982120.9920.9420.6220.1719.82(87)Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) $(88)m=$ 20.0220.0220.0320.0420.0520.0520.0520.0420.0320.03(88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) $(89)m=$ 10.990.970.90.740.520.350.390.680.940.991(89)Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) $(90)m=$ 18.4918.7919.219.6619.9420.0420.0520.052019.6118.9618.45(90)	[Jan	Feb	Mar	Apr	May	Ĺ	Jun Jul	A	ug Sep	Oct	Nov	Dec			
(87)m= 19.86 20.06 20.34 20.67 20.89 20.98 21 20.99 20.94 20.62 20.17 19.82 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.02 20.03 20.04 20.05 20.05 20.04 20.04 20.03 20.03 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 18.49 18.79 19.2 19.66 19.94 20.05 20.05 20 19.61 18.96 18.45 (90)	(86)m=	1	0.99	0.98	0.92	0.79		0.6 0.44	0.4	9 0.76	0.96	1	1		(86)	
(87)m= 19.86 20.06 20.34 20.67 20.89 20.98 21 20.99 20.94 20.62 20.17 19.82 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.02 20.03 20.04 20.05 20.05 20.04 20.04 20.03 20.03 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) 18.49 18.79 19.2 19.66 19.94 20.05 20.05 20 19.61 18.96 18.45 (90)	Mean	interna	l temperat	ure in l	iving are	a T1 (fo	Mo	w steps 3 to	7 in T	able 9c)		•				
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) $(88)m=$ 20.02 20.02 20.03 20.04 20.05 20.05 20.05 20.04 20.04 20.03 20.03 (88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) $(89)m=$ 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1(89)Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) $(90)m=$ 18.49 18.79 19.2 19.66 19.94 20.04 20.05 20.05 20 19.61 18.96 18.45 (90)	r		<u> </u>	- i			-	i	· ·	- i - '	20.62	20.17	19.82		(87)	
(88)m= 20.02 20.02 20.03 20.04 20.04 20.05 20.05 20.04 20.04 20.03 20.03 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.49 18.79 19.2 19.66 19.94 20.05 20.05 20 19.61 18.96 18.45 (90)							L									
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89) 1 (89) (89) (90)m= 18.49 18.79 19.2 19.66 19.94 20.05 20.05 20 19.61 18.45 (90)	· r		<u> </u>				-		1		20.0/	20.03	20.03		(88)	
(89)m= 1 0.99 0.97 0.9 0.74 0.52 0.35 0.39 0.68 0.94 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.49 18.79 19.2 19.66 19.94 20.04 20.05 20 19.61 18.96 18.45 (90)							L			20.04	20.04	20.03	20.03		(00)	
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.49 18.79 19.2 19.66 19.94 20.05 20.05 20 19.61 18.96 18.45 (90)	r		<u> </u>	- i	- i		<u> </u>		T			-		I	(22)	
(90)m= 18.49 18.79 19.2 19.66 19.94 20.04 20.05 20.05 20 19.61 18.96 18.45 (90)	(89)m=	1	0.99	0.97	0.9	0.74		0.52 0.35	0.3	0.68	0.94	0.99	1		(89)	
	Mean	interna	l temperat	ure in t	he rest o	f dwelli	ng	T2 (follow st	eps 3	to 7 in Tab	le 9c)	-		L		
$fLA = Living area \div (4) = 0.47$ (91)	(90)m=	18.49	18.79	19.2	19.66	19.94	2	0.04 20.05	20.						(90)	
											fLA = Li	/ing area ÷ (4	4) =	0.47	(91)	

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

Apply adjustment to the mean internal temperature from Table 4e, where appropriate (83) (93) 113 13 133 137 20.16 (20.35 0.48 0.48 0.48 0.49 0.44 0.09 1153 10.00 (83) (94) (95) (95) (94) 113 1 138 10.72 (20.16 (20.35 0.48 0.48 0.48 0.49 0.44 0.09 1155 10.00 (83) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (95) (95) 0.5 0.00 (74.20 0.98 0.74 0.20 0.13 0.44 61 600.66 544.28 02.76 0.98 0.74 0.20 (96) (94) (95) (97.71 8.97.6) 1144.58 1027.67 1120.67 800.13 64.61 600.66 544.28 02.76 0.98 0.74 0.20 (96) (96) (96) (13) 4.3 0.5 8.0 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (98) (96) (97) 124.2 08.8 1 103.34 197.5 1 123.25 0 0.0 0 0 1311.12 683.37 103.6 0 (97) (97) 124.2 08.8 1 103.34 197.5 1 123.25 0 0.0 0 0 11.12 683.37 103.6 0 (97) Space heating requirement network kWh/moht = 0.024 x [97)/m - (95)/m x (41)/m (96) (97) Space heating requirement in WWh/m2/year 20.3 0 0 0 0 0 11.12 683.37 103.6 0 (97) Space heating requirement in WWh/m2/year 20.2 0 (20.0 x (1 - 0.20)] = 1 0 (20.1 0.0 x (1 - 0.20)] = 1 0 (20.1 0.0 x (1 - 0.20)] = 1 0 (20.1 0.0 x	(92)m=	19.13	19.38	19.74	20.14	20.39	20.48	20.49	20.49	20.44	20.09	19.53	19.09		(92)	
(S3)me 13:13 19:74 20:14 20:39 20:48 20:44 20:44 20:69 19:53 15:06 (S3) 8. Space heating requirement Space heating requirement Space heating requirement (S4)			nent to t	he mear	internal	tempera	ature fro	m Table	4e. whe		opriate					
Set 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: (4)m			1	r	r 1	-	r		1		-	19.53	19.09		(93)	
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m 1 0.98 0.97 0.9 0.76 0.55 0.39 0.44 0.71 0.94 0.98 1 (94) Useful gains, hmGm W = (94)m x (84)m (95)m 797.18 987.6 114.65 122.75 112.067 809.13 544.81 569.66 834.28 927.52 809.05 742.92 (95) Monthly average external temperature from Table 8 (96)m 23 4.9 6.5 8.9 17.7 14.0 16.6 16.4 14.1 10.6 7.1 4.2 (96) Monthly average external temperature, hm. W = (93)m x (93)m - (96)m] (97)m 214.5 2088.85 193.34 1997.59 1232.69 825.88 546.83 573.5 893.76 1345.7 1771.07 2132.29 (97) Space heating requirement for each month, kWh/month = 0.024 x (197)m - (95)m 1 x (41)m (99)m 1002.41 739.99 564.96 286.42 83.35 0 0 0 0 3 11.12 893.37 1033.69 Space heating requirement in kWh/m2/year Total per year (kWNyear) = Sum(85),, = 4696.3 (98) Space heating requirement in kWh/m2/year Space heating requirement (calculated above) 1002.41 739.99 564.96 284.2 83.30 0 0 0 0 311.12 693.37 103.80 (211) Fraction of space heat from main system 1 (204) = (203) = 488.5 (206) Ifficiency of main space heating system 1 (204) = (203) = 488.5 (206) Ifficiency of main space heating system 1 (204) = (203) = 488.5 (206) Ifficiency of main space heating system 1 (206) (202) = (211) Ifficiency of water heater Ifficiency of water heater (calculated above) Ifficiency of water heater (calculated above) Iffi	8. Sp	ace hea	iting req	uirement												
					•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate		
Utilisation factor for gains, hn: (a)m= 1 0.99 0.97 0.9 0.76 0.56 0.39 0.44 0.71 0.94 0.99 1 Useful gains, hmCm, W= (94)m x (84)m (96)m= 797.18 987.68 1144.64 1227.57 1120.67 609.13 544.61 569.66 834.28 927.52 808.05 742.92 (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)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 (97)m= 2144.5 2088.88 1903.94 1997.59 1232.99 825.85 546.03 97.35 983.76 13457 1771.07 2132.29 Space heating requirement for month, KWh/month = 0.024 x [(97)m - (95)m] x [(41)m (99)m= 1002.41 739.99 564.96 266.42 83.35 0 0 0 0 0 311.12 893.37 1033.69 Total per year (WMh/year) = Sum(30); s.c. = 4095.3 [98]. Space heating requirement in kWh/m2/year. Space heating requirement (calculated above) Efficiency of space heating system 1 (209 = 200) x (1 - (203)) = 1 (201) Fraction of space heating system 1 (209 = 200) x (1 - (203)) = 1 (201) Fraction of space heating system 1 (200 = 200) x (1 - (203)) = 1 (201) Efficiency of secondary/supplementary system Space heating requirement (calculated above) (11)m = [(198)m x (201)] 1 x 100 - (206) (211)m = [(198]m x (201)] 1 x 100 - (206) (211)m = [(198]m x (201)] 1 x 100 - (206) (211)m = [(198]m x (201)] 1 x 100 - (206) (211)m = 1 (33.6 193.8 125.8 167.57 167.3 168.4 193.44 193.44 133.99 Total (WWhyear) = Sum(215),,, = 0 (215) Water heating (219)m = 648.16 202.48 137.17 78.06 188.48 152.58 167.57 167.32 168.49 198.47 (217) Fuel for water heater (219)m = (48.16 218.48 232.13 211.77 214.71 199.22 191.2 209.8 209.68 218.81 226.98 241.89] (219)m = 448.16 218.48 232.13 211.77 214.71 199.2 191.2 209.8 209.68 218.81 226.98 241.89]	the ut		1	<u> </u>												
	Litilio				·	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Useful gains, hmGm, W = (94)m x (84)m (95)m 742.92 (95)m (95)m= 797.18 987.68 1144.58 1227.57 1120.67 903.13 544.61 560.66 834.28 927.52 908.06 742.92 (95) (90)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.5 16.4 14.1 10.6 7.1 4.2 (96) (90)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.5 16.4 14.1 10.6 7.1 4.2 (96) (90)m= 1.3 4.9 6.5 8.9 11.7 14.6 16.5 16.4 14.1 10.6 7.1 4.2 (96) (90)m= 1.002.41 739.99 564.96 266.42 83.35 0 0 0 131.12 893.75 1033.69 Fraction of space heating requirement in kWh/m2/year 20.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 2.2 1.2 2.2		r	r – – – – –	r	r i	0.76	0.55	0.39	0.44	0.71	0.94	0.99	1		(94)	
(95)m 797.18 987.69 1144.58 1227.57 1120.67 809.13 644.61 569.66 834.28 927.52 806.05 742.92 (95) Monthly average external temperature from Table 8 (96)m 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (95) (97)m 2144.5 2088.06 1903.94 1997.59 1232.20 825.68 546.63 573.5 893.78 134.57 1771.07 2132.20 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m = (95)m] x (41)m (98)m= 1002.41 739.99 564.96 266.42 83.35 0 0 0 131.12 693.37 1033.69 Space heating requirement in kWh/m2/year		L ul gains,							_	_						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		<u> </u>	i	i È	<u> </u>	<i>.</i>	809.13	544.61	569.66	834.28	927.52	808.05	742.92		(95)	
Heat loss rate for mean internal temperature, Lm, W = [(39)m × [(93)m - (96)m] (97)m (97)m 2144.5 2088.86 1903.94 1597.59 1232.69 325.68 546.63 573.5 893.76 1345.7 1771.07 2132.29 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m 1002.41 739.99 564.98 264.28 33.3 0 0 0 311.12 693.37 1033.69 Space heating requirement for each month, kWh/m2/year 234.88 (09) 34.88 (09) Space heating: Total per year (kWh/year) = Sum(96)	Mont	hly aver	age exte	ernal tem	perature	from Ta	able 8									
	(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Heat	loss rate	e for me	an interr	· · · ·	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	-	r	i			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		_											2132.29		(97)	
Total per year (kWh/year) = Sum(98)sz = 4695.3 (98) Space heating requirement in kWb/m2/year 34.88 (99) Space heating: 0 (201) Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system 1 (202) = 1 - (201) = Fraction of total heating from main system 1 (204) = (202) × 1 - (203)! = 11 (204) Efficiency of main space heating system 1 Use of total heating from main system 1 (204) = (202) × 1 - (203)! = 11 (204) Good for total heating from main system 1 (204) = (202) × 1 - (203)! = 11 (204) Use condary/supplementary heating system, % Colspan="2">(211) (211) (211) Colspan="2">(211) (211) Colspan="2">(211) (211) (211) (212) <td c<="" td=""><td>•</td><td></td><td>ř</td><td>r</td><td></td><td></td><td></td><td></td><td></td><td>Ì</td><td><u> </u></td><td><i>,</i></td><td></td><td>l</td><td></td></td>	<td>•</td> <td></td> <td>ř</td> <td>r</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Ì</td> <td><u> </u></td> <td><i>,</i></td> <td></td> <td>l</td> <td></td>	•		ř	r						Ì	<u> </u>	<i>,</i>		l	
Space heating requirement in kWh/m²/year 34.88 (39) 9a. Energy requirements - Individual heating systems including micro-CHP) Space heating: 0 (201) Fraction of space heat from secondary/supplementary system 0 (201) 1 (202) Fraction of space heat from main system (s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × (1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × (1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (308) (206) (102.41 739.99 564.96 266.42 83.35 0 0 0 0 311.12 693.37 1038.69 (211)m = ([(98)m x (204)] > x 100 + (206) (211) (211) (211) (211) Improvement (calculated above) Total (kWhiyear) =Sum(211)_{LAB-LT2} = 5021.71 (211) Space heating requirement (calculated above) Total (kWhiyear) =Sum(215)_{LAB-LT2} = 5021.71 (211) Space heating fuel (secondary), kWh/month = ([(98)m x (201)]) × 100 + (208) (215) Total (kWhiyear) =Sum(215)_{LAB-LT2} = 0 (215) Water heating 193.26	(98)m=	1002.41	739.99	564.96	266.42	83.35	0	0	÷	÷	-					
9a. Energy roquirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from main system(s) $(202) = 1 - (201) =$ 1 (202) Fraction of space heat from main system 1 $(202) = 1 - (201) =$ Fraction of total heating from main system 1 $(202) = 1 - (203) =$ Efficiency of main space heating system 1 $(202) \times (1 - (203)) =$ Efficiency of secondary/supplementary heating system, % 0 Uan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Tota</td><td>l per year</td><td>(kWh/year</td><td>) = Sum(9</td><td>8)15,912 =</td><td>4695.3</td><td>(98)</td></td<>									Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	4695.3	(98)	
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of space heat from main system(s) (204) = (202) $\times (1 - (203)) =$ 1 (204) Efficiency of main space heating system 1 (204) = (202) $\times (1 - (203)) =$ 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) 93.5 (206) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1002.41 739.99 564.96 266.42 83.35 0 0 0 311.12 693.37 103.69 (211) (1072.09 791.43 604.24 284.94 89.14 0 0 0 332.75 741.57 1105.55 5021.71 (211) Space heating tuel (secondary), kWh/month = ([(98)m x (201)]) x 100 ÷ (208) (215) Total (kWh/year) =Sum(215), _sso	Spac	e heatin	g requir	ement in	kWh/m ²	/year								34.88	(99)	
Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × (1 - (203)) = 1 (204) Efficiency of main space heating system 1 (204) = (202) × (1 - (203)) = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) 0 0 0 (208) Space heating requirement (calculated above) 1002.41 739.99 564.96 266.42 83.35 0 0 0 332.75 741.57 1105.55 (211) $= [[(98)m \times (204)]] \times 100 \div (206)$ (211) $= [(98)m \times (204)]] \times 100 \div (208)$ (211) (211) $= [(98)m \times (201)]] \times 100 \div (208)$ (211) $= [(98)m \times (201)]] \times 100 \div (208)$ (211) $= [(98)m \times (201)]] \times 100 \div (208)$ (215) $= [(98)m \times (201)]] \times 100 \div (208)$ (215) Water heater (calculated above) $= [(198)m \times (201)]] \times 100 \div (208)$ (215) $= (216) \\ (217)m = [8.37 & 80.55 & 87.4 & 85.83 & 82.93 & 79.8 & 79.8 & 79.8 & 79.8 & 86.14 & 87.87 & 88.47 \\ (217) \\ (217)m = [8.37 & 80.55 & 87.4 & 85.83 & 82.93 & 79.8 & 79.8 & 79.8 & 79.8 & 61.44 & 87.87 & 88.47 \\ (217) \\ Fuel for water heating, kWh/month \\ (219)m = (44)m \times$	9a. En	ergy rea	quiremer	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)				_		
Fraction of space heat from main system(s) $(202) = 1 - (201) =$ 1 (202) Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ 1 (204) Efficiency of main space heating system 1 33.5 (206) 33.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) 33.5 (206) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (212) (212) (212) (212) (212) (212) (212) (212) (212) (212) (212) (212) <td>-</td> <td></td> <td>-</td> <td></td>	-		-													
Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.5 (206) Image: Space heating requirement (calculated above) 0 (208) Image: Space heating requirement (calculated above) 0 0 0 (211) Image: Space heating requirement (calculated above) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211)		-					mentary			(004)					4	
Efficiency of main space heating system 1 93.5 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1002.41 739.99 564.96 266.42 83.35 0 0 0 311.12 693.37 103.69 (211) Total (kWh/year) = Sum(21) (211) 1002.41 739.99 564.96 266.42 83.35 0 0 0 332.75 741.57 1105.55 (211) (211) (212) (211) 1072.09 791.43 604.24 284.94 89.14 0 0 0 332.75 741.57 1105.55 (211) (211) Space heating fuel (secondary), kWh/month (219) Space heating fuel (secondary), kWh/month (215) Vater heating (216) (219) (219.3 193.26 202.89														1		
Efficiency of secondary/supplementary heating system, % $ \begin{array}{c c c c c c c c c c c c c c c c c c c $, in the second s				(204) = (2)	02) × [1 –	(203)] =			1		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Efficie	ency of	main spa	ace heat	ing syste	em 1								93.5	(206)	
Space heating requirement (calculated above)	Efficie	ency of	seconda	ry/suppl	ementar	y heating	g system	n, %						0	(208)	
$\frac{1002.41}{739.99} \frac{564.96}{266.42} \frac{266.42}{83.35} \frac{0}{0} \frac{0}{0} \frac{0}{0} \frac{0}{311.12} \frac{693.37}{1033.69} $ $(211) m = \{[(98)m \times (204)] \} \times 100 \div (206) $ $(211) m = \{[(98)m \times (204)] \} \times 100 \div (206) $ $Total (kWh/year) = Sum(211)_{1.4.1917}^{2.4.9.4} = \frac{5021.71}{105.55} $ $(211) m = \{[(98)m \times (201)] \} \times 100 \div (208) $ $(215) m = 0 0 0 0 0 0 0 0 0 0$								Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Spac		ř	· `		,								l		
$\frac{1072.09}{791.43} \begin{array}{c} 604.24 \\ 284.94 \\ 89.14 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $		1002.41	739.99	564.96	266.42	83.35	0	0	0	0	311.12	693.37	1033.69			
$Total (kWh/year) = Sum(211)_{1.a.1012} = 5021.71$ (211) Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208) (215)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(211)n		í	1	<u>`</u>	,								I	(211)	
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208) (215)m= 0 0 0 0 0 0 0 0 0 0 Total (kWh/year) =Sum(215) _{16.10_112} 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1072.09	791.43	604.24	284.94	89.14	0	0								
$ = \{ [(98) \text{m x } (201)] \} \text{ x } 100 \div (208) $ $ (215) \text{m} = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 $	•		/						TULA	ii (KVVII/yea	ar) =3um(2	(11) _{15,1012}	Ē	5021.71	(211)	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	•		•		• • •	month										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			T	· · · ·		0	0	0	0	0	0	0	0			
Water heating Output from water heater (calculated above) 219.3 193.26 202.89 181.77 178.05 158.98 152.58 167.57 167.32 188.49 199.44 213.99 Efficiency of water heater (217)m= 88.37 88.05 87.4 85.83 82.93 79.8 79.8 79.8 79.8 86.14 87.87 88.47 (217) Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219.48 232.13 211.77 214.71 199.22 191.2 209.99 209.68 218.81 226.98 241.89	(,								-	-	-	-	-	0	(215)	
Output from water heater (calculated above) 219.3 193.26 202.89 181.77 178.05 158.98 152.58 167.57 167.32 188.49 199.44 213.99 Efficiency of water heater 79.8 (216) (217)m= 88.37 88.05 87.4 85.83 82.93 79.8 79.8 79.8 86.14 87.87 88.47 (217) Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219.17) 219.12 209.99 209.68 218.81 226.98 241.89	Water	heating	u c											-		
Efficiency of water heater 79.8 (216) $(217)m =$ 88.37 88.05 87.4 85.83 82.93 79.8 79.8 79.8 79.8 86.14 87.87 88.47 (217) Fuel for water heating, kWh/month $(219)m =$ $(64)m \times 100 \div (217)m$ (219)m = 248.16 219.48 232.13 211.77 214.71 199.22 191.2 209.99 209.68 218.81 226.98 241.89			-	ter (calc	ulated al	oove)							-			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		219.3	193.26	202.89	181.77	178.05	158.98	152.58	167.57	167.32	188.49	199.44	213.99			
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$ $(219)m = 248.16$ 219.48 232.13 211.77 214.71 199.22 191.2 209.99 209.68 218.81 226.98 241.89	Efficie	ncy of w	ater hea	ater										79.8	(216)	
$(219)m = (64)m \times 100 \div (217)m$ $(219)m = 248.16 \ 219.48 \ 232.13 \ 211.77 \ 214.71 \ 199.22 \ 191.2 \ 209.99 \ 209.68 \ 218.81 \ 226.98 \ 241.89$	(217)m=	88.37	88.05	87.4	85.83	82.93	79.8	79.8	79.8	79.8	86.14	87.87	88.47		(217)	
(219)m= 248.16 219.48 232.13 211.77 214.71 199.22 191.2 209.99 209.68 218.81 226.98 241.89			•													
	. ,					214.71	199.22	191.2	209.99	209.68	218.81	226.98	241.89			
		L	1	1	1		1		Tota	l = Sum(2 ⁻		I	1	2624	(219)	

Annual totals		kWh/year	г	kWh/year	1
Space heating fuel used, main system 1			L	5021.71	
Water heating fuel used				2624	
Electricity for pumps, fans and electric keep-hot					
central heating pump:		[30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230a)	(230g) =		75	(231)
Electricity for lighting				477.34	(232)
12a. CO2 emissions - Individual heating systems	including micro-CHP				
	Energy kWh/year	Emission factors kg CO2/kWh	or	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216	-	1084.69	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	= [566.78	(264)
Space and water heating	(261) + (262) + (263) + (264) =		[1651.47	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	= [2 <mark>47.74</mark>	(268)
Total CO2, kg/year	sum o	of (265)(271) =		1938.14	(272)
TER =			L	14.4	(273)

		Us	er Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Prope	erty Address:	5F					
Address : 1. Overall dwelling dime	ansions:								
			Area(m²)		Av. Hei	aht(m)		Volume(m ³)	
Ground floor		, Г	. ,	(1a) x		85	(2a) =	275.88	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	∟ e)+(1n) [96.8	(4)			J		_
Dwelling volume		, , , <u>,</u>			+(3c)+(3d))+(3e)+	.(3n) =	275.88	(5)
								210.00	
2. Ventilation rate:	main s	econdary	other		total			m ³ per hour	
Number of chimneys	heating	neating] = [40 =	-	-
		0	0	. L	0		l	0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa	INS				3	x 1	10 =	30	(7a)
Number of passive vents	;				0	x 1	10 =	0	(7b)
Number of flueless gas f	ires				0	x 4	40 =	0	(7c)
							Air ch	anges <mark>per</mark> ho	ur
Infiltration due to chimne					30		÷ (5) =	0.11	(8)
If a pressurisation test has b		ed, proceed to (17), otherwise c	ontinue fro	om (9) to (16)	r		٦
Number of storeys in t Additional infiltration	ne dwelling (ns)					[(0)	1]x0.1 =	0	(9) (10)
Structural infiltration: 0	25 for steel or timber	frame or 0.3	5 for masonr	v constr	uction	[(3)-	1,0.1 -	0	(10)
if both types of wall are p	resent, use the value corres			•	uouon		l	0	_ (,,,)
deducting areas of openi If suspended wooden		led) or 0.1 (s	ealed) else	ontor ()			ſ	0	(12)
If no draught lobby, en							l	0	(12)
Percentage of window	·	ripped						0	(14)
Window infiltration	5		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	· (15) =	ĺ	0	(16)
Air permeability value,	q50, expressed in cut	oic metres pe	r hour per so	quare m	etre of e	nvelope	area	5	(17)
If based on air permeabi	lity value, then (18) = [(1	7) ÷ 20]+(8), oth	nerwise (18) = (16)				0.36	(18)
Air permeability value applie		s been done or a	a degree air per	meability i	is being us	ed	r		٦
Number of sides sheltere Shelter factor)d		(20) = 1 - [0.075 x (1	9)] =			2	(19)
Infiltration rate incorporation	ting shelter factor		(21) = (18)		-/1		l I	0.85	(20) (21)
Infiltration rate modified f	-	4	() ()	()			l	0.3	
Jan Feb	Mar Apr May	Jun Ju	ul Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	1 · 1 ·	11							
(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 (22-) (2	2)m : 4	I					J		
Wind Factor $(22a)m = (2)$ (22a)m 1.27 1.25	2)m ÷ 4 1.23 1.1 1.08	0.95 0.9	95 0.92	1	1.08	1.12	1.18		
	0		0.02	•					

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	_			
	0.39	0.38	0.37	0.34	0.33	0.29	0.29	0.28	0.3	0.33	0.34	0.36		
	ate effect echanica		-	rate for t	he appli	cable ca	se						0	(23a)
				endix N. (2	3b) = (23a	a) × Fmv (e	equation (1	N5)), othei	wise (23b) = (23a)			0	(23a) (23b)
		• •	0 11		, (, ,	• •	n Table 4h	,	, (,			0	(23c)
			-	-	_					2h)m + (23h) x [[,]	1 – (23c)	-	(200)
(24a)m=	i	0		0	0	0				0			. 100]	(24a)
	LI	d mech:	l anical ve	Intilation	without	L heat rec	L coverv (N	I MV) (24b	m = (22)	l 2b)m + ()	L 23b)			
(24b)m=	0	0	0	0	0	0		0	0	0	0	0		(24b)
	whole h	ouse ex	tract ver	tilation o	or positiv	L ve input v	ı ventilatio	n from c	outside					
,					•	•		c) = (22b		5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,					•			on from l			•			
	r í í		<u> </u>	<u> </u>	<i>.</i>	· · ·	<u> </u>	0.5 + [(2	· ·	- <u>-</u>			l	
(24d)m=		0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
	· · · · ·		i	· · ·		r i	, <u>,</u>	d) in boy	· ,		I	1	I	
(25)m=	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
3. He	at l <mark>osse</mark> s	s and he	at loss	oaramete	er:									
ELEN	<mark>/IE</mark> NT	Gros		Openin		Net Ar		U-valu		AXU		k-value		AXk
Windo	ws Type	area	(m²)	m	4	A ,r		W/m2 /[1/(1.4)+		(W/I	K)	kJ/m²•ł	^	kJ/K
	ws Type					3.25	= .	/[1/(1.5)+	Ļ	4.31	8			(27)
	ws type	2				14.45		r	0.04] =	20.45	H,			(27)
Floor	T 4			_	\	96.8	×	0.13	=	12.584			╡┝ <u></u>	(28)
Walls		32.2	21	9.75		22.46	3 ×	0.18	= [4.04			\dashv \square	(29)
Walls -		11.6	9	0		11.69) X	0.18	= [2.1			\exists	(29)
Walls 7		24.2	23	14.4	5	9.78	x	0.18	= [1.76				(29)
Walls -	Type4	10.5	5	0		10.55	5 X	0.18	=	1.9				(29)
Walls	Type5	15.3	9	0		15.39) X	0.18	=	2.77				(29)
Total a	area of e	lements	, m²			190.8	5							(31)
	dows and le the area						ated using	g formula 1,	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	3.2	
	heat los				o ana pan			(26)(30)	+ (32) =				58.53	(33)
	apacity (,					((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
	al mass		. ,		- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
			•					recisely the	indicative	values of	TMP in Ta	able 1f		`
	used instea													
	al bridge					-	<						9.54	(36)
	s of therma abric hea		are not kn	own (36) =	= 0.15 x (3	1)			(33) +	(36) =			00.07	(27)
	ation hea		alculator	Imonthly	,					= 0.33 × (25)m x (5)		68.07	(37)
ventild	Jan	Feb	Mar	Apr	/ May	Jun	Jul	Aug	Sep	= 0.33 x (Nov	Dec		
(38)m=	52.4	52.13	51.87	50.64	50.41	49.34	49.34	49.14	49.75	50.41	50.88	51.36		(38)
	ransfer c									= (37) + (37)			l	x - 7
(39)m=	120.47	120.21	119.95	118.72	118.49	117.41	117.41	117.22	117.83	118.49	118.95	119.44		
	FSAP 201									Average =		I	118.761	ge 2 of 3 9)
			(-											<u> </u>

Heat lo	ss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.24	1.24	1.24	1.23	1.22	1.21	1.21	1.21	1.22	1.22	1.23	1.23		
			L		1	1	1	ļ	·	L Average =	Sum(40)1.	₁₂ /12=	1.23	(40)
Numbe		1	nth (Tab	, ,	Max	lun		A	San	Oct	Nev	Dee	1	
(41)m=	Jan 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
(41)11=	31	20	51	30	31	30	31	31	30	31	30	31		(41)
4. Wat	ter hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF/	A > 13.	ipancy, 9, N = 1 9, N = 1		(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		71]	(42)
Reduce t	he annua	al average	hot water		5% if the c	welling is	designed	(25 x N) to achieve		se target o		.51		(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 T	Table 1c x	(43)					1	
(44)m=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42	108.36		
Energy c	ontent of	hot water	used - cal	lculated m	onthly $= 4$.	190 x Vd,r	m x nm x [OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1182.14	(44)
(45)m=	160.7	140.55	145.03	126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		_
lf instanta	aneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1549.97	(45)
(46)m= Water s	24.1	21.08	21.76	18.97	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
	-		includir	ng any se	olar or W	/WHRS	storage	within sa	ame ves	sel	<u> </u>	150	1	(47)
-				ank in dw										
			hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
Water s	-		oclarad I	oss facto	or ie kno	wp (k\\/k	a/dav/):					05	1	(40)
			m Table				i/uay).					65]	(48)
				, ∠D e, kWh/ye	oor			(48) x (49) –			54		(49)
•••			-	cylinder		or is not	known:	(40) × (43)	, –		0.	89		(50)
Hot wat	ter stor	age loss		rom Tab								0]	(51)
	•	from Ta		011 4.0								0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)
Energy	lost fro	m watei	storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or	(54) in (5	55)								0.	89		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			-	
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
If cylinde	r contain	s dedicate	d solar sto	orage, (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=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66]	(57)
Primary	/ circuit	loss (ar	nnual) fro	om Table	e 3							0]	(58)
							. ,	65 × (41)						
, r		1	r	ı —	· · · · · ·	i	r	ng and a	· ·	· · · · · ·	, <u> </u>	a	1	
(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 mont	h (61)m =	(60)) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0		0	0	0	0	0	0	0		(61)
Total h	eat rec	uired for	water	heating	calculate	d for	eac	n month	(62)m =	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	211.63	186.55	195.96	6 175.7	3 172.25	15	3.98	147.94	162.25	161.94	182.22	192.6	206.55]	(62)
Solar DH	IW input	calculated	using Ap	opendix (or Appendi	x H (ı	negati	ve quantity	/) (enter 'C)' if no sola	r contribu	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	S and/o	r 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	vater hea	ter							-	-		-		
(64)m=	211.63	186.55	195.96	6 175.7	3 172.25	15	3.98	147.94	162.25	161.94	182.22	192.6	206.55		-
									Out	put from w	ater heate	er (annual)₁	12	2149.59	(64)
Heat g	ains fro	om water	heatin	g, kWh	month 0.2	25 ´ [[0.85	× (45)m	+ (61)n	n] + 0.8 >	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	94.17	83.53	88.96	81.4	7 81.08	74	4.24	73	77.76	76.88	84.39	87.08	92.49		(65)
inclu	de (57))m in calo	culatior	n of (65	m only if	cylin	der 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	ба):										
Metab	olic gai	ns (Table	e 5), Wa	atts							-		-	_	
	Jan	Feb	Mar	Ар	r May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	135.39	135.39	135.39	135.3	9 135.39	13	5.39	135.39	135.39	135.39	1 <mark>3</mark> 5.39	135.39	135.39		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	(calcula	ted in <i>I</i>	Append	x L, equa	tion	L9 o	r L9a), <mark>a</mark>	lso see	Table 5					
(67)m=	22.38	19.88	1 <mark>6</mark> .17	12.2	9.15	7	.72	8.35	10.85	14.56	18.49	21.58	23		(67)
App <mark>lia</mark>	nces ga	ains (ca <mark>lc</mark>	ulated	in Appe	endix L, ec	juati	on L	13 or L1	3a), also	o see Ta	ble 5				
(68)m=	<mark>25</mark> 1.05	253.65	247.09	233.1	1 215.47	19	8.89	187.81	185.21	191.77	205.75	223.39	239.97		(68)
Cookir	g gains	s (calcula	ted in .	Append	ix L, equa	ition	L15	or L15a)	, also s	ee Table	5				
(69)m=	36.54	36.54	36.54	36.5	4 36.54	36	6.54	36.54	36.54	36.54	36.54	36.54	36.54		(69)
Pumps	and fa	ins gains	(Table	5a)										·	
(70)m=	3	3	3	3	3		3	3	3	3	3	3	3		(70)
Losses	s e.g. e	vaporatio	n (neg	ative va	lues) (Tal	ble 5	5)				•				
(71)m=	-108.31	-108.31	-108.3	I -108.3	1 -108.31	-10	8.31	-108.31	-108.31	-108.31	-108.31	-108.31	-108.31		(71)
Water	heating	, g gains (T	able 5)	•	•						-			
(72)m=	126.58	124.3	119.58	3 113.1	5 108.98	10	3.11	98.12	104.51	106.78	113.43	120.94	124.31		(72)
Total i	nterna	I gains =		•	•		(66)	m + (67)m	ı + (68)m	+ (69)m +	(70)m + (71)m + (72)	m		
(73)m=	466.62	464.45	449.45	5 425.1	2 400.22	37	6.34	360.89	367.19	379.74	404.29	432.53	453.9]	(73)
6. So	lar gain	IS:		-	•						<u>.</u>	-			
Solar g	ains are	calculated	using so	lar flux fr	om Table 6a	and	assoc	ated equa	tions to co	onvert to th	ne applica	ble orientat	ion.		
Orienta		Access F		Ar			Flu		_	g_	-	FF		Gains	
		Table 6d		n	2	_	Ta	ole 6a	1	able 6b	1	able 6c		(W)	_
East	0.9x	3		x	3.25	×	1	9.64	x	0.63	x	0.7	=	58.52	(76)
East	0.9x	3		x	3.25	x	3	8.42	x	0.63	x	0.7	=	114.48	(76)
East	0.9x	3		x	3.25	×	6	3.27	x	0.63	x [0.7	=	188.54	(76)
East	0.9x	3		x	3.25	× [g	2.28	x	0.63	x [0.7	=	274.97	(76)
East	0.9x	3		x	3.25	×	1	13.09	x	0.63	x	0.7	=	336.99	(76)

East	0.9x	3	x	3.2	5	x	1	15.77	x	0.63	x	0.7		= [344.96	(76)
East	0.9x	3	x	3.2	5	x	1	10.22	x	0.63	x	0.7		=	328.42	(76)
East	0.9x	3	x	3.2	5	x	9	4.68	x	0.63	x	0.7		=	282.11	(76)
East	0.9x	3	x	3.2	5	x	7	3.59	x	0.63	x	0.7		=	219.28	(76)
East	0.9x	3	x	3.2	5	x	4	5.59	x	0.63	x	0.7		=	135.84	(76)
East	0.9x	3	x	3.2	5	x	2	4.49	x	0.63	x	0.7		=	72.97	(76)
East	0.9x	3	x	3.2	5	x	1	6.15	x	0.63	x	0.7		= [48.13	(76)
South	0.9x	0.77	x	14.4	45	x	4	6.75	x	0.63	x	0.7		=	206.46	(78)
South	0.9x	0.77	x	14.4	45	x	7	6.57	x	0.63	x	0.7		= [338.13	(78)
South	0.9x	0.77	x	14.4	45	x	9	7.53	x	0.63	x	0.7		=	430.72	(78)
South	0.9x	0.77	x	14.4	45	x	1	10.23	x	0.63	x	0.7		=	486.81	(78)
South	0.9x	0.77	x	14.4	45	x	1	14.87	x	0.63	x	0.7		= [507.28	(78)
South	0.9x	0.77	x	14.4	45	x	1	10.55	x	0.63	x	0.7		= [488.19	(78)
South	0.9x	0.77	x	14.4	45	x	1	08.01	x	0.63	x	0.7		= [476.99	(78)
South	0.9x	0.77	x	14.4	45	x	10	04.89	x	0.63	x	0.7		=	463.23	(78)
South	0.9x	0.77	x	14.4	45	x	10	01.89	x	0.63	x	0.7		= [449.94	(78)
South	0.9x	0.77	x	14.4	45	x	8	2.59	x	0.63	x	0.7		= [364.71	(78)
South	0.9x	0.77	x	14.4	45	x	5	5.42	х	0.63	x	0.7		=	244.73	(78)
South	0.9x	0.77	×	14.4	45	х		40.4	x	0.63	x	0.7		=	178.4	(78)
														-		
Solar o	ains in	watts, ca	lculated	l for eacl	n mont	h			(83)m	= Sum(74)m	ı(82)n	1				
(83)m=	264.98	452.61	619.26	761.78	844.27	-	33.16	805.41	745				226.5	53		(83)
Total g	ains – i	nternal a	nd solar	[·] (84)m =	= (73)m	+ (83)m	, watts	<u> </u>		-					
(84)m=	731.61	917.07	1068.71	118 <mark>6.9</mark>	1244.49	9 1	209.5	1166.31	1112	2.52 1048.95	5 904.8	34 750.23	680.4	43		(84)
7 Me	an inter	nal temp	erature	(heating	seaso	n)			•				•			
-							area	rom Tab	ole 9.	Th1 (°C)				ſ	21	(85)
		tor for ga	• •			-			,	(-)				L		
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	A	ug Sep	Oc	t Nov	De	ec		
(86)m=	0.99	0.98	0.96	0.9	0.77		0.6	0.44	0.4	<u> </u>	0.93	0.99	1			(86)
Mean	interna	l tempera	ature in	living are		follo	w ste	ns 3 to 7	ı 7 in T	able 9c)	-					
(87)m=	19.78	20.01	20.32	20.64	20.87	-	20.97	20.99	20.	<i>,</i>	20.6	2 20.13	19.7	'3		(87)
		II				_					_		1			
1 emp (88)m=	19.88	auring n 19.89	eating p 19.89	19.9	1 rest o 19.9	-	/eiiing 19.91	19.91	19.	9, Th2 (°C) 91 19.91	19.9	19.9	19.8	20		(88)
						_				19.91	19.8	19.9	19.0	59		(00)
		tor for ga				-			ŕ		1		1			(00)
(89)m=	0.99	0.98	0.95	0.86	0.71		0.5	0.33	0.3	0.62	0.9	0.98	0.99	9		(89)
Mean	interna	l tempera	ature in	the rest	of dwe	ling	T2 (f	ollow ste	eps 3	to 7 in Tab	ole 9c)	-	-			
(90)m=	18.28	18.62	19.06	19.51	19.78	1	9.89	19.91	19.	91 19.86	19.4		18.2	22		(90)
											fLA = L	iving area ÷	(4) =		0.41	(91)
Mean	interna	l tempera	ature (fo	r the wh	ole dw	ellin	g) = fl	_A × T1	+ (1	– fLA) × T2	2					
(92)m=	18.89	19.2	19.58	19.97	20.23	2	20.34	20.35	20.	35 20.3	19.9	6 19.34	18.8	34		(92)
										whore one						

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

												I	(00)
(93)m= 18.89	19.2	19.58	19.97	20.23	20.34	20.35	20.35	20.3	19.96	19.34	18.84		(93)
8. Space he									4 T : /'	70)			
Set Ti to the the utilisation			•		ied at ste		Table 9	o, so tha	it II,m=(76)m an	d re-caic	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	1	1	1	i		1						I	()
(94)m= 0.99	0.98	0.94	0.87	0.73	0.54	0.38	0.41	0.65	0.9	0.98	0.99		(94)
Useful gains	1	<u>````</u>	ŕ	r Ó	655.02	400.04	450.40	000 45	040 70	704.40	075 70	l	(95)
(95)m= 724.75		1006.47		910.16		438.31	459.46	686.15	813.78	734.49	675.72		(93)
Monthly ave (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 rat							_			7.1	7.2		(00)
(97)m= 1758.04		1	1314.55	i	i	440.84	463.44	730.64	1108.86	1456.41	1748.47		(97)
Space heati													
(98)m= 768.77		418.05	206.25	74.52	0	0	0	0	219.54	519.78	798.12		
		1					Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3558.74	(98)
Space heati		amont in	k\//b/m2	2/voor						, (26.76	(99)
	• •			•								36.76	(99)
9a. Energy re	•	nts – Indi	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
Space heat Fraction of s		t from c	ocondar	v/cupplo	montory	evetom						0	(201)
					inentary			(201) -					
Fraction of s							(202) = 1 ·		(0.0.0)7			1	(202)
Fraction of to	otal heati	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of	main spa	ace heat	ing syste	em 1								93.5	(206)
Effi <mark>cienc</mark> y of	seconda	ry/suppl	ementar	y heatin	g system	ח, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/y	ear
Space heati	ng requir	ement (c	alculate	d above)								
768.77	553.71	418.05	206.25	74.52	0	0	0	0	219.54	519.78	798.12		
(211)m = {[(98	8)m x (20	04)] } x 1	00 ÷ (20)6)									(211)
822.21	592.21	447.11	220.59	79.7	0	0	0	0	234.8	555.92	853.61		
							Tota	ll (kWh/yea	ar) =Sum(2	2 11) _{15,1012}	Ē	3806.14	(211)
Space heati	ng fuel (s	econdar	y), kWh/	month									
= {[(98)m x (2	01)] } x 1	00 ÷ (20)8)		1		1					1	
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		
							Tota	ll (kWh/yea	ar) =Sum(2	2 15) _{15,1012}	Ē	0	(215)
Water heatin	•												
Output from v					450.00	447.04	400.05	404.04	400.00	400.0	000 55	l	
211.63		195.96	175.73	172.25	153.98	147.94	162.25	161.94	182.22	192.6	206.55		
Efficiency of V			05.04	00.75				70.0	05.04	07.00	00.07	79.8	(216)
(217)m= 87.95	87.54	86.79	85.24	82.75	79.8	79.8	79.8	79.8	85.31	87.33	88.07		(217)
Event for a set	. h. a f	1.1.1.1.1	4.4.4										
Fuel for water $(219)m = (64)$	•												
Fuel for water (219)m = (64 (219)m= 240.61	<u>)m x 100</u>			208.15	192.96	185.39	203.32	202.93	213.59	220.53	234.53		
(219)m <u>= (64</u>	<u>)m x 100</u>) ÷ (217)	m	208.15	192.96	185.39		202.93 Il = Sum(2		220.53	234.53	2547.04	(219)
(219)m <u>= (64</u>)m x 100 213.09) ÷ (217)	m	208.15	192.96	185.39			19a) ₁₁₂ =			2547.04 kWh/yea	
(219)m = (64 (219)m= 240.61)m x 100 213.09) ÷ (217) 225.8	m 206.15		192.96	185.39			19a) ₁₁₂ =	220.53 Wh/year			

Water bacting fuel upod				0547.04	1
Water heating fuel used				2547.04	J
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year		sum of (230a)(230g) =		75	(231)
Electricity for lighting				395.26	(232)
12a. CO2 emissions - Individual heating systems	including micro-	СНР			-
	Energy kWh/year	Emission fac kg CO2/kWh	tor	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216	=	822.13	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	550.16	(264)
Space and water heating	(261) + (262) + (26	3) + (264) =		1372.29	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	205.14	(268)
Total CO2, kg/year TER =		sum of (265)(271) =		1616.35 16.7	(272) (273)

			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201			Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Pro	operty A	Address:	6F					
Address :										
1. Overall dwelling dime	nsions:		A	(A 11.)/ = l = (
Ground floor			Area		(1a) x	Av. Hei		(2a) =	Volume(m ³)) (3a)
	- \ . (41. \ . (4 - \ . (4 - \) . (4 - \					2.	.85	(2d) =	214.03	_(3a)
Total floor area TFA = (1a	3)+(1b)+(1c)+(1d)+(1e	e)+(1n)	7	5.1	(4)					_
Dwelling volume					(3a)+(3b)	+(3c)+(3d)+(3e)+	.(3n) =	214.03	(5)
2. Ventilation rate:										
		econdary leating		other		total			m ³ per hou	•
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fai	ns				Ĺ	3	x ′	10 =	30	(7a)
Number of passive vents					Γ	0	x	10 =	0	(7b)
Number of flueless gas fi	res				Г	0	x 4	40 =	0	(7c)
					L			Air ch	anges per ho	ur
Infiltration due to chimney						30		÷ (5) =	0.14	(8)
If a pressurisation test has be Number of storeys in th		ed, proceed	to (17), o	therwise c	ontinue fro	om (9) to (16)	I		
Additional infiltration	ie dweinig (iis)						[(9)-	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0.	.25 for steel or timber	frame or 0).35 for	masonr	y constru	uction			0	(11)
	resent, use the value corres	ponding to t	he greate	er wall area	a (after			I	-	
deducting areas of openin If suspended wooden f		od) or 0 1	(coolo	d) also	optor 0			1		
If no draught lobby, ent			(Seale	u), eise					0	(12)
Percentage of windows		ripped							0	(13)
Window infiltration		npped	(0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cub	oic metres	per ho	ur per so	uare me	etre of e	nvelope	area	5	(17)
If based on air permeabili	ity value, then (18) = [(1	7) ÷ 20]+(8)	, otherwis	se (18) = (16)			İ	0.39	(18)
Air permeability value applies		s been done	or a deg	ree air per	meability i	is being us	sed			_
Number of sides sheltere	d			(20) = 1 - [0 075 v (1	0)1 -			3	(19)
Shelter factor	ing chalter factor			(20) = 1 - [(21) = (18)		5)] –			0.78	(20)
Infiltration rate incorporat	-	ı		(21) = (10)	x (20) -			l	0.3	(21)
	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		- June - Land		, lug	000	001	1107			
	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
		<u> </u>	I				L	I]		
Wind Factor $(22a)m = (22a)m $, T T				<u> </u>		· · ·			
(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 infiltra	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m				_	
	0.39	0.38	0.37	0.33	0.33	0.29	0.29	0.28	0.3	0.33	0.34	0.36		
	ate effec echanica		-	rate for t	he appli	cable ca	se							(23a)
				endix N. (2	3b) = (23a	a) x Fmv (e	equation (N5)) , othei	rwise (23b) = (23a)			0	(23a)
								n Table 4h		, (,			0	(23c)
					U		,		, ,	2h)m + (23b) x [1 – (23c)	-	(200)
(24a)m=		0		0	0	0	0	0	0	0	0	0]	(24a)
		d mech	I anical ve	Intilation	without	L heat rec	L coverv (N	I ЛV) (24b	1 = (22)	L 2b)m + (;	1 23b)		l	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	ntilation of	r positiv	i ve input v	r ventilatio	n from c	utside		ļ		1	
,					•	•		c) = (22b		5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,								on from I						
	<u> </u>		<u>, ,</u>	· · · ·	·	· · ·	<u> </u>	0.5 + [(2	r í	_	0.50	0.50	1	
(24d)m=		0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
	ctive air	change 0.57	rate - er 0.57	oter (24a) or (24t	o) or (24)	c) or (24 0.54	d) in box	(25) 0.55	0.55	0.56	0.56	1	(25)
(25)m=	0.57	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(23)
3. He	at l <mark>osse</mark>	s and he	eat loss	oaramet	er:									
ELEN		Gros are <mark>a</mark>		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·l		A X k kJ/K
Windo	ws					18.77	y x1.	/[1/(1.5)+	0.04] =	26.56				(27)
Floor						75.1	x	0.13] = [9.763				(28)
Wall <mark>s</mark> [·]	Type1	23.9	94	0		23.94	×	0.18	7 =	4.31				(29)
Walls ⁻	Type2	28.7	78	0		28.78	3 X	0.18	= [5.18				(29)
Walls ⁻	Туре3	21.6	6	18.7	7	2.89	x	0.18	=	0.52				(29)
Walls ⁻	Type4	10.8	33	0		10.83	3 X	0.18		1.95			$\neg \square$	(29)
Total a	area of e	lements	, m²			160.3	1							(31)
				effective wi nternal wal			ated using	formula 1,	/[(1/U-valu	e)+0.04] a	as given in	paragraph	1 3.2	
Fabric	heat los	s, W/K	= S (A x	U)				(26)(30)	+ (32) =				48.28	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	eter (TMF	- Cm	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	-		ere the de tailed calc		construct	ion are not	t known pr	ecisely the	e indicative	values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						8.02	(36)
			are not kn	own (36) =	= 0.15 x (3	1)								
	abric he								(33) +	(36) =			56.3	(37)
Ventila			1	monthl						= 0.33 × (r	1	1	
()	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m=	40.56	40.36	40.16	39.22	39.05	38.23	38.23	38.08	38.54	39.05	39.4	39.77]	(38)
	ransfer o		r						. ,	= (37) + (3	·	I	1	
(39)m=	96.87	96.66	96.46	95.52	95.35	94.53	94.53	94.38	94.84	95.35	95.7	96.07		
									1	Average =	Sum(39)1	12 /12=	95.52	(39)

Heat lo	oss para	ımeter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.29	1.29	1.28	1.27	1.27	1.26	1.26	1.26	1.26	1.27	1.27	1.28		
			L	L	<u> </u>	!		<u> </u>	ļ,	Average =	Sum(40)1		1.27	(40)
Numbe	Jan	/s in mo Feb	nth (Tab Mar	, 	May	lup	Jul	<u><u>Aug</u></u>	Son	Oct	Nov	Dec		
(11)m-	31	28	31	Apr 30	May 31	Jun	31	Aug 31	Sep 30					(41)
(41)m=	31	20	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	iter hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF	A > 13.	upancy, 9, N = 1 9, N = 1		(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		36		(42)
Reduce	the annua	al average	hot water		5% if the c	welling is	designed	(25 x N) to achieve		se target o		.33		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		
Ener <mark>gy</mark> (content of	hot water	used - ca	lculated m	onthly $= 4$.	190 x Vd,ı	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1083.95	(44)
(45)m=	1 <mark>4</mark> 7.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		_
lf instant	aneous w	vater heati	ng at poin	t of use (no	hot water	r storage)	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1421.23	(45)
(46)m=	22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
	storage		10.00	11.00	10.00				10.10	10.00	10.11	2		(- /
Storag	e volum	e (litres)	includir	ng any se	olar or W	WHRS	storage	within sa	ame ves	sel		150		(47)
	-	-		ank in dw	-					(0) :				
	/ise if no storage		not wate	er (this ir	iciudes i	nstantar	neous co	ombi boil	ers) ente	er 'O' in ((47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):				1	65		(48)
			m Table			,	, , ,					54		(49)
•				e, kWh/ye	ear			(48) x (49)) =			89		(50)
0,			•	cylinder		or is not	known:							
		•		rom Tabl	e 2 (kW	h/litre/da	ay)					0		(51)
	-	from Ta	ee secti ble 2a	on 4.3								0	l	(52)
			m Table	2b								0		(52)
•				e, kWh/ye	ar			(47) x (51)) x (52) x (53) =		0		(54)
		(54) in (5	-	,,	Jul				, (- , (89		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
If cylinde	er contain	s dedicate	d solar sto	prage, (57)	m = (56)m	x [(50) – ((H11)] ÷ (5	i0), else (5	7)m = (56)	m where (H11) is fro	m Append	l lix H	
(57)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(57)
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal	culated	for each	month (,	. ,	65 × (41)						
	-	· · · · · · · · · · · · · · · · · · ·	I	1	1	I	1	ng and a	· ·	· · · · · ·	1	a	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	ch	month (61)m =	(60)) ÷ 36	65 × (41))m							
(61)m=	0	0	0		0	0		0	0	0	0		0	0	0		(61)
Total h	eat rec	uired for	water	he	ating ca	alculated	l fo	r each	n month	(62)m	= 0.85 ×	(45)	m +	(46)m +	(57)m ·		
(62)m=	198.28	174.87	183.9	1	165.22	162.17	14	45.28	139.88	153.0	1 152.58	17	1.31	180.69	193.63	,	(62)
Solar Dł	-IW input	calculated	using A	ppe	ndix G or	Appendix	н (negativ	ve quantity	/) (enter	'0' if no sol	ar con	tribut	tion to wate	er heating	3)	
(add a	ddition	al lines if	FGHR	Sa	and/or V	VWHRS	ap	plies,	see Ap	pendix	(G)				-	_	
(63)m=	0	0	0		0	0		0	0	0	0		0	0	0		(63)
Output	from v	vater hea	ter													_	
(64)m=	198.28	174.87	183.9	1	165.22	162.17	14	45.28	139.88	153.0	1 152.58	17 [.]	1.31	180.69	193.63		-
										0	utput from v	vater h	neate	r (annual)	12	2020.84	(64)
Heat g	ains fro	om water	heatin	g,	kWh/m	onth 0.2	5 ´	[0.85	× (45)m	+ (61)m] + 0.8	x [(4	6)m	+ (57)m	+ (59)r	<u>n</u>]	
(65)m=	89.73	79.65	84.96	;	77.98	77.73	7	1.35	70.32	74.68	73.77	80).77	83.12	88.19		(65)
inclu	ide (57)m in calo	culatio	n o	f (65)m	only if c	ylir	nder is	s in the c	dwellin	g or hot v	water	is fi	rom com	munity	heating	
5. Int	ernal g	jains (see	e Table	e 5	and 5a):											
Metab	olic gai	ns (Table	e 5), W	att	S		_							-	-	_	
	Jan	Feb	Ma	r	Apr	Мау		Jun	Jul	Auç	g Sep		Oct	Nov	Dec		
(66)m=	118.17	118.17	118.1	7	118.17	118.17	1.	18.17	118.17	118.1	7 118.17	118	8.17	118.17	118.17		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	s (calcula	ted in <i>i</i>	Ap	pendix	_, equat	ion	L9 or	^r L9a), a	lso se	e Table 5						
(67)m=	1 <mark>8.62</mark>	16.54	13.45	;	10. <mark>1</mark> 8	7.61	6	5.43	6.94	9.03	12.12	15	5.38	17.96	19.14		(67)
App <mark>lia</mark>	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uat	ion L'	13 o <mark>r L1</mark>	3a), al	so see Ta	able	5				
(68)m=	208.9	211.06	205.6		193.97	179.29	1	65.5	156.28	154.1	1 159.57	17	'1.2	185.88	199.68		(68)
Cookir	ig gain	s (calcula	ated in	Ap	pendix	L, equat	ior	n L15	or L15a)	, also	see Tabl	e 5			-	-	
(69)m=	34.82	34.82	34.82	:	34.82	34.82	3	4.82	34.82	34.82	34.82	34	.82	34.82	34.82		(69)
Pumps	and fa	ans gains	(Table	e 5a	a)											_	
(70)m=	3	3	3		3	3		3	3	3	3		3	3	3	7	(70)
Losses	s e.g. e	vaporatio	n (neg	jati	ve valu	es) (Tab	le	5)								_	
(71)m=	-94.53	-94.53	-94.53	3	-94.53	-94.53	-9	94.53	-94.53	-94.53	3 -94.53	-94	4.53	-94.53	-94.53	7	(71)
Water	heating	, g gains (T	Table 5	5)												_	
(72)m=	120.61	118.52	114.1	9	108.3	104.48	9	9.09	94.51	100.3	3 102.46	10	8.56	115.44	118.53	·	(72)
Total i	nterna	l gains =						(66)	m + (67)m	ı + (68)r	n + (69)m +	· (70)n	n + (7	1)m + (72)	m	_	
(73)m=	409.58	407.58	394.7	·	373.91	352.83	33	32.47	319.19	324.9	7 335.6	35	6.6	380.73	398.8	7	(73)
6. So	lar gair	is:	•														
Solar g	ains are	calculated	using so	olar	flux from	Table 6a	and	associ	ated equa	tions to	convert to	he ap	plical	ole orientat	ion.		
Orienta	ation:	Access F			Area			Flu			_ g_		-	FF		Gains	
		Table 6d			m²			lat	ole 6a		Table 6b)		able 6c		(W)	_
North	0.9x	0.77		x	18.	77	x	1	0.63	x	0.63		×	0.7	=	61	(74)
North	0.9x	0.77		x	18.	77	x	2	0.32	x	0.63		×	0.7	=	116.57	(74)
North	0.9x	0.77		x	18.	77	x	3	4.53	x	0.63		×	0.7	=	198.08	(74)
North	0.9x	0.77		x	18.	77	x	5	5.46	x	0.63		×	0.7	=	318.16	(74)
North	0.9x	0.77		x	18.	77	x	7	4.72	x	0.63		×	0.7	=	428.6	(74)

North 0.9x	0.77	x	18.7	77	x	79.9	99	x	0.63	×	0.7	=	458.82	(74)
North 0.9x	0.77	x	18.7	77	x	74.6	68	x	0.63	x	0.7	=	428.37	(74)
North 0.9x	0.77	x	18.7	77	x	59.2	25	x	0.63	x	0.7	=	339.86	(74)
North 0.9x	0.77	x	18.7	77	x	41.5	52	x	0.63	x	0.7	=	238.15	(74)
North 0.9x	0.77	x	18.7	77	x	24.1	19	x	0.63	×	0.7	=	138.76	(74)
North 0.9x	0.77	x	18.7	77	x	13.1	12	x	0.63	_ x [0.7	=	75.25	(74)
North 0.9x	0.77	x	18.7	77	x	8.86	6	x	0.63	_ × [0.7	=	50.85	(74)
		_												
Solar gains in	watts, calcu	ulated	for each	n month				(83)m =	Sum(74)m .	(82)m		-		
(83)m= 61		98.08	318.16	428.6			28.37	339.86	238.15	138.76	75.25	50.85		(83)
Total gains –	internal and	solar	(84)m =	: (73)m	+ (8	83)m , w	vatts							
(84)m= 470.58	524.15 59	92.77	692.07	781.43	79	91.29 7	47.56	664.83	573.76	495.36	455.98	449.65		(84)
7. Mean inte	rnal tempera	ature ((heating	season)									
Temperature	e during hea	ting p	eriods ir	the livi	ng	area froi	m Tab	ole 9, T	h1 (°C)				21	(85)
Utilisation fa	ctor for gain	s for li	iving are	a, h1,m	(s	ee Table	e 9a)							
Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1	1 (0.99	0.96	0.87		0.7	0.54	0.62	0.87	0.98	1	1		(86)
Mean interna	a temperatu	ure in I	iving are	ea T1 (fo	Mo	w steps	3 to 7	in Ta	ole 9c)		•			
(87)m= 19.6	1	0.01	20.4	20.75	T	i	20.98	20.97	20.81	20.38	19.93	19.58		(87)
Temperature	during hear	ting n	oriode in	rost of	dw	elling fro								
(88)m= 19.85		9.85	19.86	19.86		<u> </u>	19.87	19.87	19.87	19.86	19.86	19.86		(88)
		- 1			1									
Utilisation fa		s for r 0.98	0.95	0.82	T	<u> </u>	1 able		0.8	0.97	0.99	4		(89)
(89)m= 1								0.48			0.99	1		(00)
Mean interna	т ^і т	T			<u> </u>	<u> </u>	I		1	, <u> </u>				
(90)m= 18	18.2 1	8.59	19.16	19.62	1	9.83 1	19.87	19.86	19.72	19.14	18.48	17.97		(90)
									1	LA = LIV	ing area ÷ (4	4) =	0.47	(91)
Mean interna	al temperatu	ire (fo	r the wh	ole dwe	llin	g) = fLA	× T1	+ (1 –	fLA) × T2					
(92)m= 18.76	18.93 1	9.26	19.75	20.15	2	20.36	20.4	20.39	20.24	19.73	19.17	18.73		(92)
Apply adjust	1 1	T			r –		ī			r	1	i	I	
(93)m= 18.76		9.26	19.75	20.15	2	20.36	20.4	20.39	20.24	19.73	19.17	18.73		(93)
8. Space he								-	01 41	· ـــ ــ	(70)			
Set Ti to the the utilisation			•		nea	at step	11 Of	Iable	9b, so tha	t II,m=	(76)m an	d re-caid	culate	
Jan		Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				,	-	I	I		<u> </u>	1	1			
(94)m= 1	0.99 0	0.98	0.94	0.84	(0.65 (0.47	0.55	0.83	0.97	0.99	1		(94)
Useful gains	, hmGm , W	/ = (94)m x (84	1)m										
(95)m= 468.48	520.06 58	81.98	652.69	652.84	5	10.62 3	52.85	364.66	6 475.78	479.13	452.24	448.02		(95)
Monthly ave	rage externa	al tem	perature	from T	abl	e 8								
(96)m= 4.3		6.5	8.9	11.7			16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat			i		-			- ,		ŕ – – –	1		I	100
	2 1356.03 12			806.1			58.97	376.51		870.41		1395.98		(97)
Space heatin	T T	r	1		Wh				1		1	705 00		
(98)m= 693.29	561.78 48	83.06	276.06	114.02		0	0	0	0	291.11	506.03	705.28		

								Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3630.63	(98)
Space	e heatin	g requir	ement ir	n kWh/n	n²/year								48.34	(99)
9a. En	ergy rec	luiremer	nts – Ind	ividual	heating s	ystems i	ncluding	micro-C	HP)					
•	e heatir	•	+ frame a									I	0	
					ary/supple	ementary		(202) = 1 -	- (201) -				0	(201)
	-		at from n ng from	-				(202) = 1 (204) = (20)		(203)] -			1	(202)
			ace heat		•			(204) - (20) ~ [1	(200)] –			1	(204)
				• •	ary heatin	a system	n %						93.5	(208)
LINCIO	·		· · ·	1	-	1		A.1.0	Sen	Oct	Nov	Dee	-	
Space	Jan e heatin	Feb a require	Mar ement (d	Apr alculat	May ed above	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Opuo	693.29	561.78	483.06	276.06	1	0	0	0	0	291.11	506.03	705.28		
(211)m	n = {[(98)m x (20)4)]}x´	1 100 ÷ (2	206)	1								(211)
()	741.49	600.83	516.65	295.25		0	0	0	0	311.35	541.2	754.31		
			-	•	•	•		Tota	l (kWh/yea	ar) =Sum(2	2 11) _{15,1012}	=	3883.03	(211)
· -		•			n/month									
		01)]}x1	00 ÷ (20	1				0	0	0	0	0		
(215)m=	0		0	0	0	0	0	A	÷	ar) =Sum(2	0 15).		0	(215)
Water	heating										- 15,1012	2	0	(210)
	-	·	ter (calc	ulated	above)							_		
	<mark>19</mark> 8.28	174.87	183.91	165.22	2 162.17	145.28	139.88	153.01	152.58	171.31	180.69	193.63		_
	-	ater hea	r					1					79.8	(216)
(217) <mark>m=</mark> 		87.71	87.27	86.17	83.89	79.8	79.8	79.8	79.8	8 <mark>6.22</mark>	87.42	87.96		(217)
		•	kWh/m) ÷ (217											
(219)m=		199.38	210.73	191.73	3 193.31	182.06	175.29	191.74	191.2	198.7	206.7	220.13		
								Tota	I = Sum(2 ⁻	19a) ₁₁₂ =			2386.6	(219)
	l totals		ed, main	ovetop	o 1					k	Wh/year		kWh/yea	r
•	Ũ			systen									3883.03	
	-	fuel use											2386.6	
Electric	city for p	oumps, f	ans and	electric	c keep-ho	ot								
centra	al heatin	ig pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45		(230e)
Total e	lectricity	/ for the	above,	kWh/ye	ear			sum	of (230a).	(230g) =			75	(231)
Electric	city for li	ghting											328.89	(232)
12a. (CO2 em	issions ·	– Individ	lual hea	ating syste	ems inclu	uding mi	cro-CHP						
							e rgy /h/year			Emiss kg CO2	ion fac 2/kWh	tor	Emission kg CO2/ye	
Space	heating	(main s	ystem 1)		(21	1) x			0.2	16	=	838.73	(261)

Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	515.5	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1354.24	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	170.7	(268)
Total CO2, kg/year	sum	of (265)(271) =		1563.86	(272)

TER =

20.82 (273)



			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201			Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Pro	operty A	Address:	9R					
Address :										
1. Overall dwelling dimer	nsions:		•	(2)		A 11	·) / - L	
Ground floor			Area		(1a) x	Av. Hei		(2a) =	Volume(m ³)) (3a)
	· · · / 4 h · · · / 4 h · · / 4 h · · / 4 h	.). (1)				3.	.05	(2a) =	410.53	_(3a)
Total floor area TFA = (1a	()+(10)+(10)+(10)+(10)	;)+(I I I)	1:	34.6	(4) (2a) (2b)), (2),	(2n)		-
Dwelling volume					(38)+(30)	+(3c)+(3d)+(3e)+	.(31) =	410.53	(5)
2. Ventilation rate:				- 41		4 - 4 - 1				
		econdary neating		other		total			m ³ per hou	
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 far	าร					4	× ′	10 =	40	(7a)
Number of passive vents					Г	0	x ′	10 =	0	(7b)
Number of flueless gas fir	es				Γ	0	X 4	40 =	0	(7c)
					_			Air ch	anges per ho	ur
Infiltration due to chimney						40		÷ (5) =	0.1	(8)
If a pressurisation test has be		ed, proceed	to (17), o	otherwise c	ontinue fro	om (9) to (16)			
Number of storeys in th Additional infiltration	e dweiling (ns)						[(9)]	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0.1	25 for steel or timber	frame or (0.35 for	masonr	v constr	uction	[(0)	1,00.1 -	0	
if both types of wall are pre	esent, use the value corres				•			Į	0	
deducting areas of opening	- · · ·	lad) ar 0 1		d) alaa	ontor O					
If suspended wooden fl If no draught lobby, ent			i (Seale	u), eise					0	(12)
Percentage of windows		ripped							0	(13)
Window infiltration		mppod		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)
Air permeability value, o	q50, expressed in cub	oic metres	s per ho	ur per so	quare m	etre of e	nvelope	area	5	(17)
If based on air permeabili	ty value, then (18) = [(1	7) ÷ 20]+(8)), otherwis	se (18) = (16)			ĺ	0.35	(18)
Air permeability value applies		s been done	e or a deg	ıree air per	meability i	is being us	sed			_
Number of sides sheltered	d			(20) = 1 - [0 075 v (1	0)1 -			2	(19)
Shelter factor	ng abaltar faatar			(20) = 1 ⁻ [(21) = (18)		5)] –			0.85	(20)
Infiltration rate incorporati	-	J		(21) = (10)	x (20) -			l	0.3	(21)
Infiltration rate modified fo	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe			001	Aug	UCP	001		Dee		
	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
	I	<u> </u>					I	I		
Wind Factor $(22a)m = (22a)m $, 									
(22a)m= 1.27 1.25 1	.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	peed) =	= (21a) x	(22a)m						
0.38	0.37	0.36	0.32	0.32	0.28	0.28	0.27	0.3	0.32	0.33	0.35			
Calculate effect		-	rate for t	ne appli	cable ca	se					Г		0 (2	:3a)
If exhaust air he			endix N, (2	3b) = (23a	ı) × Fmv (e	quation	N5)), other	wise (23b	o) = (23a)		L T			:3b)
If balanced with	heat reco	very: effici	ency in %	allowing f	or in-use fa	actor (fro	m Table 4h)	=			Γ			:3c)
a) If balance	d mecha	anical ve	ntilation	with hea	at recove	ery (MV	ΉR) (24a)m = (2	2b)m + (2	23b) × [*	∟ (23c) – 1	÷ 100]	,	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0	-	(2	.4a)
b) If balance	d mecha	anical ve	ntilation	without	heat rec	overy (MV) (24b)m = (2	2b)m + (2	23b)				
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2	.4b)
c) If whole ho	ouse ext	tract ven	tilation c	or positiv	ve input v	ventilati	on from c	utside						
if (22b)m		(23b), t	hen (240	c) = (23b); otherv	vise (24	łc) = (22b) m + 0	.5 × (23b)	,			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2	4c)
d) If natural v if (22b)m							on from l 0.5 + [(2		0.5]					
(24d)m= 0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.56	0.56		(2	.4d)
Effective air	change	rate - en	iter (24a) or (24b	o) or (24d	c) or (24	4d) in box	(25)			-			
(25)m= 0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.56	0.56		(2	5)
3. Heat losses	and he	at loss b	baramete	er:										
3. Heat losses	Gros	s	oaramete Openin m	gs	Net Are A .n		U-valu W/m2		A X U (W/ł	()	k-value		A X k kJ/K	
	Gros area	s	Openin	gs	Net Are A ,n 2.66	n²		K	A X U (W/ł 3.76	<)	k-value kJ/m²·k		kJ/K	27)
ELEMENT	Gros area 1	s	Openin	gs	A ,n	n²	W/m2	K 0.04] =	(VV/ł	()			kJ/K (2	?7) ?7)
ELEMENT Windows Type	Gros area 1 2	s	Openin	gs	A ,n 2.66	n ² x	W/m2 1/[1/(1.5)+	K 0.04] = 0.04] =	(VV/k 3.76	<)			kJ/K (2 (2	
ELEMENT Windows Type Windows Type	Gros area 1 2 3	s	Openin	gs	A ,n 2.66 8.43		W/m2 1/[1/(1.5)+ 1/[1/(1.5)+	K 0.04] = 0.04] = 0.04] =	(W/k 3.76 11.93				kJ/K (2 (2 (2	?7)
ELEMENT Windows Type Windows Type Windows Type	Gros area 1 2 3	s	Openin	gs	A ,n 2.66 8.43 2.22		W/m2 I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 3.76 11.93 3.14				kJ/K (2 (2 (2 (2	27) 27)
ELEMENT Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 3	:S (m²)	Openin	gs	A ,n 2.66 8.43 2.22 10.65		W/m2 I/(1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.7)+(K 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 3.76 11.93 3.14 15.07 7.418516				kJ/K (2 (2 (2 (2 (2	27) 27) 27) 27)
ELEMENT Windows Type Windows Type Windows Type Rooflights	Gros area 1 2 3 4 4	4	Openin m	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4	n ² x x x x x x x x x x x x x x x x x x x	W/m2 //[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.5)+ /[1/(1.7)+(0.18	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 3.76 11.93 3.14 15.07				kJ/K (2 (2 (2 (2 (2 (2) (2) (2)	27) 27) 27) 27) 27b) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2	Gros area 1 2 3 4 4 4 44.4	4 2	Openin m 0 8.43	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77	n ²	W/m2 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.7)+(0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 3.76 11.93 3.14 15.07 7.418516 7.99 1.58				kJ/K (2 (2 (2 (2 (2 (2 (2) (2) (2) (2)	27) 27) 27) 27b) 29) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3	Gros area 1 2 3 4 4 4 4 4 4 4 4 4 4 2 3.6	4 2 3	Openin m 0 8.43 10.65	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15	n ²	W/m2 I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.7)+(0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = =	(W/k 3.76 11.93 3.14 15.07 7.418510 7.99 1.58 2.37				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2))))))))))))	27) 27) 27) 27b) 27b) 29) 29) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4	Gros area 1 2 3 4 4 44.4 17.2 23.8 15.9	4 2 3	Openin m 0 8.43 10.65	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15 15.9	n ²	W/m2 I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.7)+(0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = =	(W/k 3.76 11.93 3.14 15.07 7.418516 7.99 1.58 2.37 2.86				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2))))))))	27) 27) 27) 27) 29) 29) 29) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5	Gros area 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 3 6 1 5 5 22.5	4 2 3 9	Openin m 0 8.43 10.65 0 0	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15 15.9 22.9	n ² x x x x x x x x x x x x x x x x x x x	W/m2 1/(1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.7)+(0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = =	(W/k 3.76 11.93 3.14 15.07 7.418516 7.99 1.58 2.37 2.86 4.12				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2))))))))	27) 27) 27) 27) 27b) 29) 29) 29) 29) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Walls Type6	Gros area 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5	4 2 3 9	Openin m 0 8.43 10.65 0 0 2.22	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15 15.9 22.9 2.28	n ²	W/m2 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.5)+ 1/[1/(1.7)+(0.18 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	(W/k 3.76 11.93 3.14 15.07 7.418516 7.99 1.58 2.37 2.86 4.12 0.41				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (27) 27) 27) 27) 27) 29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Walls Type6 Walls Type7	Gros area 1 2 3 4 4 44.4 17.2 23.8 15.9 22.9 4.5 16.5	4 2 3 9 5	Openin m 0 8.43 10.65 0 0 2.22 7.98	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15 15.9 22.9 2.28 8.52		W/m2 I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.7)+(1.5)+ 0.18 0.18 0.18 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = =	(W/k 3.76 11.93 3.14 15.07 7.418510 7.99 1.58 2.37 2.86 4.12 0.41 1.53				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (27) (7) (7) (77) (29) (29) (29) (29) (29) (29) (29) (29
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Walls Type6	Gros area 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 4 2 3 9 9 1 5 6	Openin m 0 8.43 10.65 0 0 2.22	gs 2	A ,n 2.66 8.43 2.22 10.65 4.36383 44.4 8.77 13.15 15.9 22.9 2.28	n ² x x x x x x x x x x x x x x x x x x x	W/m2 I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ I/[1/(1.5)+ [0.18] 0.18 0.18 0.18 0.18 0.18 0.18	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	(W/k 3.76 11.93 3.14 15.07 7.418516 7.99 1.58 2.37 2.86 4.12 0.41				kJ/K (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2	 27) 27) 27) 27) 27) 29)

* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	86.18
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	0
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m ² K	Indicative Value: Medium	250

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

(33) (34) (35)

can be ι	ised inste	ad of a de	tailed calc	ulation.										
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						13.99	(36)
if details	of therma	al bridging	are not kri	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			100.17	(37)
Ventila	tion 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=	77.34	76.97	76.6	74.89	74.56	73.07	73.07	72.79	73.65	74.56	75.21	75.89		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	177.51	177.13	176.77	175.05	174.73	173.24	173.24	172.96	173.81	174.73	175.38	176.06		
Heat In	oss nara	meter (H	HLP), W	/m²K			•	•		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	175.05	(39)
(40)m=	1.32	1.32	1.31	1.3	1.3	1.29	1.29	1.28	1.29	1.3	1.3	1.31]	
(10)	1.02	1.02		1.0	1.0	1.20	1.20	1.20			Sum(40)1.		1.3	(40)
Numbe	er of day	vs in moi	nth (Tab	le 1a)						inolugo –			1.0	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	iter heat	ting ener	rgy requ	irement:								kWh/ye	ear:	
													1	
		ipancy, l A N – 1		[1 - exp	(-0.0003	49 x (TF	-4 -13 9)2)] + 0.0)013 v (1	TFA -13		91		(42)
	A £ 13.9		1.70 /		(0.0000		A 10.5	/2/] 1 0.0)	11 / 10.	.5)			
								(25 x N)				3.22		(43)
				usage by { [•] day (all w				to achieve	a water us	se target o	f			
normore												_	1	
Hot wat	Jan	Feb	Mar day for o	Apr ach month	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	-													
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	105.28	109.41	113.54		
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	m x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		1238.61	(44)
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
										Total = Su	m(45) ₁₁₂ =		1624.02	(45)
lf instant	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)					
(46)m=	25.26	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	storage		includir		olor or M		ctorado	within sa		col		150	1	(47)
-		. ,					-			501		150		(47)
	•	-		ink in dw ar (this in	-			(47) mbi boil	ars) ente	er '0' in (47)			
	storage		not wate			istantai								
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):				1.	65		(48)
			m Table			,	,					54		(49)
				, kWh/ye	ar			(48) x (49)	=			89		(50)
			-	cylinder l		or is not		(10) // (10)			0.	09		(00)
,				om Tabl								0		(51)
	•	-	ee secti	on 4.3										
		from Ta										0		(52)
Tempe	erature f	actor fro	m Table	2b								0		(53)

		om water (54) in (5	-	e, kWh/yo	ear			(47) x (51)) x (52) x (53) =		0 89		(54) (55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m	L			. ,
(56)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	n where (H11) is fro	m Append	ix H	
(57)m=	27.66	24.99	27.66	26.77	27.66	26.77	27.66	27.66	26.77	27.66	26.77	27.66		(57)
Primar	v circuit	loss (ar	nual) fro	om Table	e 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 wat	ter heatir	ng and a	, cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss 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	eat 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=	219.3	193.26	202.89	181.77	178.05	158.98	152.58	167.57	167.32	188.49	199.44	213.99		(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	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)				I	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter										I	
(64)m=	219.3	193.26	202.89	181.77	178.05	158.98	152.58	167.57	167.32	18 <mark>8.4</mark> 9	199.44	213.99		_
								Outp	out from wa	ater heate	r (annual)₁	12	2223.63	(64)
Heat g	ains fro	m water	heating.	, kWh/m	onth 0.2	5 / [0.85	× (45)m	+ (61)m	1] + 0.8 x	(<mark>46)m</mark>	+ (57)m	<mark>+ (</mark> 59)m]	
(65)m=	96.73	85.76	91.27	83.48	83.01	75.9	74.54	79.53	78.67	86.48	89.35	94.96		(65)
inclu	ide (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 5	5 and 5a):									
Metab	olic gair	s (Table	<u>5), Wat</u>	ts				i				i		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3		(66)
0	g gains	È	ted in Ap	opendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				I	
(67)m=	27.03	24.01	19.52	14.78	11.05	9.33	10.08	13.1	17.58	22.33	26.06	27.78		(67)
Applia	nces ga	ins (calc	ulated ir	n Appeno	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			1	
(68)m=	303.18	306.33	298.4	281.52	260.22	240.19	226.82	223.67	231.6	248.48	269.78	289.81		(68)
Cookir	ng gains	(calcula	· · · · · · · · · · · · · · · · · · ·		· · ·	tion L15	or L15a)		e Table				I	
(69)m=	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53		(69)
Pumps	and fa	ns gains	(Table \$	5a)										
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	s e.g. ev	aporatic	on (nega	tive valu	es) (Tab	le 5)				-				
(71)m=	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24		(71)
Water	heating	gains (T	able 5)											
(72)m=	130.01	127.62	122.67	115.94	111.57	105.42	100.19	106.89	109.27	116.24	124.1	127.63		(72)
Total i	nternal	gains =				(66)	m + (67)m	n + (68)m -	+ (69)m + ((70)m + (7	1)m + (72)	m		
(73)m=	529.81	527.55	510.19	481.84	452.43	424.53	406.67	413.25	428.04	456.63	489.54	514.81		(73)
6. So	lar gains	S:												

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

Orientation	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North 0.9	9x 0.77	x	10.65	x	10.63	x	0.63	x	0.7	=	34.61	(74)
North 0.9	0.77 0.77	x	10.65	x	20.32	x	0.63	x	0.7	=	66.14	(74)
North 0.9	0.77 0.77	x	10.65	x	34.53	x	0.63	x	0.7	=	112.39	(74)
North 0.9	9x 0.77	x	10.65	x	55.46	x	0.63	x	0.7	=	180.52	(74)
North 0.9	0.77 0.77	x	10.65	x	74.72	x	0.63	x	0.7	=	243.18	(74)
North 0.9) x 0.77	x	10.65	x	79.99	x	0.63	x	0.7	=	260.33	(74)
North 0.9) x 0.77	x	10.65	x	74.68	x	0.63	x	0.7	=	243.06	(74)
North 0.9	x 0.77	x	10.65	×	59.25	x	0.63	x	0.7	=	192.83	(74)
North 0.9) x 0.77	x	10.65	×	41.52	x	0.63	x	0.7	=	135.13	(74)
North 0.9	0.77 0.77	x	10.65	x	24.19	x	0.63	x	0.7	=	78.73	(74)
North 0.9	0.77 0.77	x	10.65	x	13.12	x	0.63	x	0.7	=	42.7	(74)
North 0.9	0.77	x	10.65	x	8.86	x	0.63	x	0.7	=	28.85	(74)
East 0.9	3 3	x	2.66	x	19.64	x	0.63	x	0.7	=	47.9	(76)
East 0.9	9x 3	x	2.66	x	38.42	x	0.63	x	0.7	=	93.7	(76)
East 0.9	3 3	x	2.66	×	63.27	x	0.63	x	0.7	=	154.31	(76)
East 0.9	3 3	x	2.66	×	92.28	Х	0.63	Х	0.7	=	225.05	(76)
East 0.5	9x 3	x	2.66	x	113.09	x	0.63	x	0.7	=	275.81	(76)
East 0.9	9x 3	x	2.66	х	115.77	X	0.63	x	0.7	=	282.34	(76)
East 0.9	9x 3	x	2.66	x	110.22	x	0.63	x	0.7	=	268.8	(76)
East 0.9	9x 3	x	2.66	x	94.68	х	0.63	x	0.7	=	230.89	(76)
East 0.9	Ox 3	x	2.66	x	73.59	×	0.63	x	0.7	=	179.47	(76)
East 0.9	Эх 3	x	2.66	x	45.59	x	0.63	x	0.7	=	111.18	(76)
East 0.9	3	x	2.66	×	24.49	x	0.63	x	0.7	=	59.72	(76)
East 0.9	9x 3	x	2.66	x	16.15	x	0.63	x	0.7	=	39.39	(76)
South 0.9	0.77 0.77	x	8.43	×	46.75	x	0.63	x	0.7	=	120.45	(78)
South 0.9) x 0.77	x	8.43	×	76.57	x	0.63	x	0.7	=	197.26	(78)
South 0.9	0.77 0.77	x	8.43	x	97.53	x	0.63	x	0.7	=	251.28	(78)
South 0.9	9x 0.77	x	8.43	×	110.23	x	0.63	x	0.7	=	284	(78)
South 0.9	0.77	x	8.43	×	114.87	x	0.63	x	0.7	=	295.94	(78)
South 0.9	9x 0.77	x	8.43	x	110.55	x	0.63	x	0.7	=	284.81	(78)
South 0.9	9x 0.77	x	8.43	×	108.01	x	0.63	x	0.7	=	278.27	(78)
South 0.9	0.77	x	8.43	×	104.89	x	0.63	x	0.7	=	270.24	(78)
South 0.9	0.77	x	8.43	x	101.89	x	0.63	x	0.7	=	262.49	(78)
South 0.9	9x 0.77	x	8.43	×	82.59	x	0.63	x	0.7	=	212.77	(78)
South 0.9	9x 0.77	x	8.43	x	55.42	x	0.63	x	0.7	=	142.77	(78)
South 0.9	9x 0.77	x	8.43	×	40.4	x	0.63	x	0.7	=	104.08	(78)
West 0.9	0.77	x	2.22	×	19.64	x	0.63	x	0.7	=	13.33	(80)
West 0.9		x	2.22	×	38.42	x	0.63	x	0.7	=	26.07	(80)
West 0.9	0.77	x	2.22	×	63.27	x	0.63	x	0.7	=	42.93	(80)

	r	_	-	1		1		-				-
West 0.9		×	2.22	X	92.28	X	0.63	×	0.7	_ =	62.61	(80)
West 0.9	0.77	x	2.22	x	113.09	x	0.63	×	0.7	=	76.73	(80)
West 0.9	0.77	x	2.22	x	115.77	x	0.63	x	0.7	=	78.55	(80)
West 0.9	0.77	x	2.22	x	110.22	x	0.63	×	0.7	=	74.78	(80)
West 0.9	0.77	x	2.22	x	94.68	x	0.63	x	0.7	=	64.23	(80)
West 0.9	0.77	x	2.22	x	73.59	x	0.63	x	0.7	=	49.93	(80)
West 0.9	0.77	x	2.22	x	45.59	×	0.63	×	0.7	=	30.93	(80)
West 0.9	0.77	x	2.22	x	24.49	x	0.63	x	0.7	=	16.61	(80)
West 0.9	0.77	x	2.22	x	16.15	x	0.63	x	0.7	=	10.96	(80)
Rooflights 0.9	<mark>ر 1</mark>	x	4.36	x	26	x	0.63	x	0.7	=	45.03	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	54	×	0.63	x	0.7		93.53	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	96	x	0.63	x	0.7	=	166.27	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	150	×	0.63	×	0.7	=	259.8	(82)
Rooflights 0.9	۲ ۲	x	4.36	x	192	x	0.63	×	0.7		332.55	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	200	x	0.63	×	0.7	= =	346.4	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	189	x	0.63	×	0.7	=	327.35	(82)
Rooflights 0.9	< <u>1</u>	x	4.36	x	157	x	0.63	×	0.7	= =	271.92	(82)
Rooflights 0.9	(1	x	4.36	X	115	x	0.63	x	0.7	=	199.18	(82)
Rooflights 0.9	(1	×	4.36	x	66	x	0.63	x	0.7	╡	114.31	(82)
Rooflights 0.9	< 1	₩ ×	4.36	x	33	×	0.63	x	0.7	=	57.16	(82)
Rooflights 0.9	< <u>1</u>	×	4.36	x	21	x	0.63	x	0.7	- 1	36.37	(82)
						J	0,00					
Solar gains i	n watts cal	ulated	for each mon	th		(83)m	r = Sum(74)m	.(82)m				
(83)m= 261.3		T	1011.98 1224.2		252.43 1192.26	<u> </u>		547.92	2 318.96	219.65		(83)
Total gains -	- internal an	d solar	(84)m = (73)n	ו 1 + (ג	83)m , watts							
(84)m= 791.1	2 1004.25 1	237.37	1493.82 1676.6	64 16	676.96 1598.93	1443	3.38 1254.24	1004.5	5 808.5	734.46		(84)
7 Mean int	ernal tempe	rature (heating seaso	nn)		•	- 1 - 1				1	
	•		eriods in the li		area from Tak	ole 9	Th1 (°C)				21	(85)
•	•	•••	ving area, h1,	Ũ							21	
Jar		Mar	Apr Ma	<u> </u>	Jun Jul	A	ug Sep	Oct	Nov	Dec		
				/								
(86)m= 1	0.99	0.98	0.93 0.81		0.62 0.47	0.5	3 0.8	0.97	1	1		(86)
								0.97	1	1		(86)
Mean inter	nal temperat	ure in li	iving area T1	(follo	w steps 3 to 7	r in T	able 9c)		_]	
Mean inter (87)m= 19.53	nal temperat	ure in 1 20.09	iving area T1 20.5 20.82	(follo	w steps 3 to 7	7 in T 20.	able 9c) 98 20.87	0.97 20.43	_	1		(86) (87)
Mean interr (87)m= 19.53 Temperatu	nal temperat	ture in li 20.09	iving area T1 20.5 20.82 eriods in rest o	(follo	w steps 3 to 7 20.96 20.99 relling from Ta	7 in T 20. able §	able 9c) 98 20.87 9, Th2 (°C)	20.43	19.89	19.49]	(87)
Mean inter (87)m= 19.53	nal temperat	ure in 1 20.09	iving area T1 20.5 20.82	(follo	w steps 3 to 7	7 in T 20.	able 9c) 98 20.87 9, Th2 (°C)		19.89		 	
Mean intern (87)m= 19.53 Temperatu (88)m= 19.83	nal temperat	ating pe	iving area T1 20.5 20.82 eriods in rest of 19.84 19.84 est of dwelling	(follo 2 of dw	w steps 3 to 7 20.96 20.99 relling from Ta 9.85 19.85	7 in T 20. able 9 19.	able 9c) 98 20.87 9, Th2 (°C)	20.43	19.89	19.49]	(87) (88)
Mean intern (87)m= 19.53 Temperatu (88)m= 19.83	nal temperat	ating pe	iving area T1 20.5 20.82 eriods in rest of 19.84 19.84	(follo 2 2 2 3 3 4 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1	w steps 3 to 7 20.96 20.99 relling from Ta 9.85 19.85	7 in T 20. able 9 19.	able 9c) 98 20.87 9, Th2 (°C) 85 19.85	20.43	19.89	19.49	 	(87)
Mean interr ($(87)m=$ 19.53 Temperatu ($(88)m=$ 19.83 Utilisation f ($(89)m=$ 1	nal temperat 19.74 re during he 19.83 19.83 actor for gai 0.99	ating period	iving area T1 20.5 20.82 eriods in rest of 19.84 19.84 est of dwelling	(follo 2 of dw 1 1, h2	w steps 3 to 7 20.96 20.99 relling from Ta 9.85 19.85 m (see Table 0.53 0.35	7 in T 20. able 9 19. 9a)	able 9c) 98 20.87 9, Th2 (°C) 85 19.85 1 0.72	20.43 19.84 0.95	19.89 19.84	19.49 19.83	 	(87) (88)
Mean interr ($(87)m=$ 19.53 Temperatu ($(88)m=$ 19.83 Utilisation f ($(89)m=$ 1	nal temperat 19.74 re during he 19.83 19.83 actor for gai 0.99 nal temperat	ating period	iving area T1 20.5 20.82 eriods in rest of 19.84 19.84 est of dwelling 0.91 0.75	(follo 2 of dw 1 1, h2 elling	w steps 3 to 7 20.96 20.99 relling from Ta 9.85 19.85 m (see Table 0.53 0.35	7 in T 20. able 9 19. 9a)	able 9c) 98 20.87 9, Th2 (°C) 85 19.85 1 0.72 to 7 in Table	20.43 19.84 0.95	19.89 19.84 0.99	19.49 19.83		(87) (88)
Mean interr (87)m= 19.53 Temperatu (88)m= 19.83 Utilisation f (89)m= 1 Mean interr	nal temperat 19.74 re during he 19.83 19.83 actor for gai 0.99 nal temperat	ating pe 19.83 ns for r 0.97	iving area T1 20.5 20.82 eriods in rest of 19.84 19.84 est of dwelling 0.91 0.75 he rest of dwe	(follo 2 of dw 1 1, h2 elling	w steps 3 to 7 20.96 20.99 relling from Ta 9.85 19.85 m (see Table 0.53 0.35 T2 (follow ste	7 in T 20. able 9 19. 9a) 0.4 eps 3	able 9c) 98 20.87 9, Th2 (°C) 85 19.85 10.72 to 7 in Table 85 19.75	20.43 19.84 0.95 e 9c) 19.19	19.89 19.84 0.99	19.49 19.83 1 1 1 17.83	0.47	(87) (88) (89)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

Apply adjustment to the mean internal temperature from Table 4e, where appropriate (83) (83)m 18.65 18.27 12.03 20.38 20.32 12.07 19.77 19.11 18.65 (83) Ses Space heating requirement Stat 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 gians, hm: (94) Usine 1 0.98 0.97 0.57 0.57 0.41 0.47 0.75 0.98 1 (94) Usine 1 0.98 0.97 0.57 0.57 0.41 0.47 0.75 0.98 1 (94) Useful gains, hm: (94) Useful gains, hm: (94) (94) (94) (94) (94) (94) (94) (94) (94) (94) (95) (96) (96) (97) (96) (97) (96) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (97) (98) ((92)m=	18.65	18.92	19.34	19.86	20.21	20.36	20.38	20.38	20.27	19.77	19.11	18.61		(92)
B. Space heating: Open field of the secondary/supplementary system Total per year (WMiyear) = Sun(25), so that Ti,m=(76)m and re-calculate the utilisation factor for gians, hm: (94) Utilisation factor for gians, hm: (94) Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gians, hm: (94) 0.91 0.77 0.57 0.41 0.75 0.95 0.90 1 (94) Useful gains, hm: (99) 1 0.91 0.77 0.57 0.41 0.47 0.75 0.95 1 (94) Useful gains, hm: (99) 1 0.81 0.5 8.9 1.17 14.8 16.4 14.1 10.8 7.1 4.2 (96) (90) 4.3 4.3 0.5 8.3 11.7 14.8 16.4 14.1 10.8 7.1 4.2 (96) Space heating: (77.7) 0.96.44 10.02.4 × ((97)m - (96)m) (97.1 193.8.5 194.2.4 (99) Space heating: 177.26.4 406.84 148	Apply	adjustn	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilization factor for gains, hm: Image: Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate Utilization factor for gains, hm: Image: Set Ti to the mean internal temperature from Table 9a Image: Set Ti to the mean internal temperature from Table 9a Image: Set Ti to the mean internal temperature from Table 9a Image: Set Ti to the mean internal temperature from Table 9a Image: Set Ti to the mean internal temperature from Table 9a Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the mean internal temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the temperature, t.m., W=(139)m × (169)m / (141)m Image: Set Ti to the temperature, t.m., W=(139)m × (169)m / (160)m / (160)m Image: Set Ti to the temperature, t.m., W=(139)m × (169)m / (160)m / (160)m Image: Set Ti to the temperature, t.m., W=(139)m / (160)m / (160)m / (160)m Image: Set Ti to the temperature, t.m., W=(139)m / (160)m / (160)m / (160)m Image: Set Ti to the temperature, t.m., W=(139)m / (160)m / (160)m / (160)m Image: Set Ti to the temperature, t.m., W=(139)m / (160)m / (1	(93)m=	18.65	18.92	19.34	19.86	20.21	20.36	20.38	20.38	20.27	19.77	19.11	18.61		(93)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hn: (94)m 1 0.99 0.97 0.91 0.77 0.57 0.41 0.47 0.76 0.96 0.99 1 (94) Useful gains, hmGm, W = (94)m × (84)m (95)m 213.33 93.913.01 1327.45 956.1 649.16 676.34 942.8 956.53 0.21 732.59 (95) Monthly average external temperature from Table 8 (96)m 23 4.9 6.5 8.9 11.7 14.0 16.6 16.4 14.1 10.6 7.1 4.2 (96) Monthly average external temperature, hm, W = (93)m × (93)m (93)m (96)m] (97)m 2547.52 2483.77 2270.37 1917.79 1486.89 997.31 655.83 688.46 1073.18 100.225 2106.13 2538.9 (97) Space heating requirement for each month, KWh/month = 0.024 × (197)m - (95)m 1× (41)m (99)m 1308.84 1001 796.4 406.64 149.39 0 0 0 0 480.41 938.9 1342.42 Total per year (kWhyleer) = 5um(96) _{1.15.4} = 6422 (199) Space heating requirement in kWh/m2/year Total per year (kWhyleer) = 5um(96) _{1.15.4} = 6422 (199) Fraction of space heat from main system 1 (204) = (202) × (1 - (203)) = 1 1 (204) Efficiency of main space heating system 1 (204) = (202) × (1 - (203)) = 1 1 (204) Efficiency of ascendrar/supplementary system Fraction of space heat from main system 1 (204) = (202) × (1 - (203)) = 1 1 (204) Efficiency of ascendrar/supplementary heating system 5% (202) = 1 - (201) = 1 1 (204) Efficiency of ascendrar/supplementary heating system 5% (202) = 1 - (201) = 1 1 (204) Efficiency of ascendrar/supplementary heating system 1 (204) = (202) × (1 - (203)) = 1 1 (204) Efficiency of ascendrar/supplementary heating system 2 Fraction of space heat from main system 1 (204) = (202) × (1 - (203)) = 1 1 (204) Efficiency of assendrary supplementary heating system 5% (202) = 1 - (201) = 1 1 (202) Efficiency of assendrary supplementary heating system 5% (202) = 1 - (201) = 1 1 (202) Efficiency of assendrary, kWh/month = (10.4 m/m) 448.2 m/m) = (10.4 m	8. Sp	ace hea	ting requ	uirement											
					•		ned at ste	ep 11 of	Table 9t	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)m 1 0.99 0.97 0.91 0.77 0.57 0.51 0.41 0.47 0.75 0.95 0.99 1 Useful gains, hmGm, W = (94)m X (84)m (96)me 728.33 99.418 1198.94 1353.01 1287.45 95.4 649.16 676.34 942.8 956.53 802.1 732.58 (96)me 728.33 99.418 1198.94 1353.01 1287.45 95.4 649.16 676.34 942.8 956.53 802.1 732.58 (96)me 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96)me 1.3 4.9 6.5 8.9 11.7 148.83 997.31 655.83 684.0 1073.18 1022.5 [2108.13 2338.9 (97) Space heating requirement amonth, KWh/moth = 0.024 x [(97)m - (95)m] (41)m (99)me 1001 795.4 408.64 148.39 0 0 0 0 400.4 938.9 1342.42 Total per year (Whylear) = Sum(90) = 6423 198) Space heating requirement in kWh/m2/year 93. Encry requirements - Individual Heating systems including micro-CHP) Space heating requirement in kWh/m2/year 94.7 72 499 Space heating requirement in kWh/m2/year 95. Encry requirements - Individual Heating systems including micro-CHP) Space heating requirement (calculated above) Efficiency of secondary/supplementary system 1 (200) = 2000 x 11 - (203) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1 (200) = 1	the ut		i	<u> </u>							<u> </u>				
						Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm , W = (94)m x (84)m (95)m 738.33 994.81 1199.941 135.311 1287.45 998.1 649.16 676.34 942.8 956.53 802.1 732.58 (95) Monthly average external temperature from Table 8 (96)m 4.3 6.5 8.8 117.7 1.4.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) (90)m= 2.4.9 2.5 2.8.7.2 2.70.7.37 197.7.79 148.68 993.3 (65.63 88.41 1073.18 1190.2.25 2106.13 258.0.9 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m (98)m= 1398.4 1393.4 1342.42 (98) Space heating requirement in kWh/m2/year 0 0 0 0 0 407.41 93.8 1342.42 Total per year (kWhiyear) = Sum(80)se 6423 (99) 93.5 (209) 140.41 93.8 1342.42 (98) Space heating requirements in KWh/m2/year (202) = 1 - (201) = 1 (202) 1 - (203) = 1 (204) Fraction of space heat from m				r i		0.77	0.57	0.41	0.47	0.75	0.05	0.00	1		(94)
(95)mm 788.33 994.18 1199.94 1353.01 1287.45 958.1 649.16 676.34 942.8 956.53 802.1 732.58 (95) Monthly average external temperature from Table 8 (90)m 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.0 7.1 4.2 (96) (90)m= 4.3 4.9 6.5 8.9 11.7 14.8 16.6 16.4 14.1 10.0 7.1 4.2 (96) (97)m= 2547.52 2483.77 2270.37 1917.79 1486.89 997.31 656.63 686.40 1073.18 1690.2 2106.13 258.9 (97) Space heating requirement for each month, kWh/month = 0.024 x (97)m (93)m 400.41 938.9 1342.42 111 110 202.1 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11 (202) 11							0.57	0.41	0.47	0.75	0.95	0.99	I		(54)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		<u> </u>		``````````````````````````````````````	<i>,</i> ,	<u> </u>	958.1	649,16	676.34	942.8	956.53	802.1	732.58		(95)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								010.10	010.01	0 12.0	000.00	002.1	102.00		()
		· ·		i			1	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		loss rate	e for mea	I an intern	al tempe	erature.	L	l =[(39)m_	I x [(93)m·	L – (96)m]				
			i	1			· · · · · · · · · · · · · · · · · · ·	-· /		r Ó Ó		2106.13	2536.9		(97)
	Space	e heatin	g require	ement fo	r each n	nonth, k	Nh/mon	h = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m			
Space heating requirement in kWh/m²/year 47.72 (39) Space heating: 0 (201) Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × (1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × (1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (206) (206) (211) Ias8.4 1001 796.4 406.64 148.39 0 0 48.91 134.242 (211) (218) m x (204)] > x 100 + (206) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) <td>-</td> <td></td> <td>r</td> <td>1</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1342.42</td> <td></td> <td></td>	-		r	1			1						1342.42		
9a. Energy roquirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from main system(s) $(202) = 1 - (201) =$ 1 (202) Fraction of space heat from main system(s) $(202) \times (1 - (203)) =$ Fraction of total heating from main system 1 $(202) \times (1 - (203)) =$ Efficiency of main space heating system 1 $(204) = (202) \times (1 - (203)) =$ Efficiency of secondary/supplementary heating system, % 0 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1 1004.17 1435.74 Total (kWh/year) = Sum(211)_{1.505^{2}} 6669.52 (211) I399.83 1070.59 851.76 434.91 158.7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Tota</td><td>l per year</td><td>(kWh/year</td><td>·) = Sum(9</td><td>8)15,912 =</td><td>6423</td><td>(98)</td></td<>									Tota	l per year	(kWh/year	·) = Sum(9	8)15,912 =	6423	(98)
9a. Energy roquirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from main system(s) $(202) = 1 - (201) =$ 1 (202) Fraction of space heat from main system(s) $(202) \times (1 - (203)) =$ Fraction of total heating from main system 1 $(202) \times (1 - (203)) =$ Efficiency of main space heating system 1 $(204) = (202) \times (1 - (203)) =$ Efficiency of secondary/supplementary heating system, % 0 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1 1004.17 1435.74 Total (kWh/year) = Sum(211)_{1.505^{2}} 6669.52 (211) I399.83 1070.59 851.76 434.91 158.7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td>Space</td><td>e heatin</td><td>a require</td><td>ement in</td><td>kW/h/m²</td><td>/vear</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>47 72</td><td>] (99)</td></td<>	Space	e heatin	a require	ement in	kW/h/m²	/vear								47 72] (99)
Space heating: Fraction of space heat from secondary/supplementary system 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														11.12	
Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) $(202) = 1 - (201) = 1$ 1 (202) Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] = 1$ 1 (204) Efficiency of main space heating system 1 $(204) = (202) \times [1 - (203)] = 1$ 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) 0 0 0 0 (208) Space heating requirement (calculated above) 1308.84 1001 796.4 406.64 148.39 0 0 0 1342.42 (211) (211)m = {[[(98)m x (204)] } x 100 ÷ (206) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (212) (211) (211) (211) (211) (211) (211) (212) (211) (211) (211) (212) (211) (21				nts – Ind	ividual n	eating s	ystems i	nciuding	micro-C	(HP)					
Fraction of space heat from main system (s) $(202) = 1 - (201) =$ 1 (202) Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ 1 (204) Efficiency of main space heating system 1 93.5 (206) Efficiency of secondary/supplementary heating system, % 0 (206) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 1308.84 1001 796.4 406.64 148.39 0 0 0 513.81 1004.17 1435.74 (211) [[(98)m x (204)] } x 100 ÷ (206) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) <td>-</td> <td></td> <td>-</td> <td>at from s</td> <td>econdar</td> <td>v/supple</td> <td>mentary</td> <td>system</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td>7(201)</td>	-		-	at from s	econdar	v/supple	mentary	system						0	7(201)
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Efficiency of main space heating system 1 93.5 (206) Efficiency of secondary/supplementary heating system, % 0 (203) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 1308.84 1001 796.4 406.64 148.39 0 0 0 480.41 938.9 1342.42 (211) 1308.84 1001 796.4 406.64 148.39 0 0 0 480.41 938.9 1342.42 (211) 1308.84 1001 796.4 406.64 148.39 0 0 0 513.81 1004.17 1435.74 (211) 1308.84 1004.17 1435.74 (211) 1308.84 1001 2(208) (211) Colspan="2">Colspan="2">Colspan="2">(211) 1308.84 1004.17 1435.74 (211) 1308 (201)] $\}$ x 100 \div (208) (211) (215)<											(202)]				
Efficiency of secondary/supplementary heating system, % $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									(204) = (204)	02) x [1 -	(203)] =				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$														93.5	(206)
Space heating requirement (calculated above)	Efficie	ency of s	seconda	ry/supple	ementar	y heating	g system	ז, %	-					0	(208)
$\frac{1308.84}{1001} 1001 796.4 406.64 148.39 0 0 0 0 480.41 938.9 1342.42$ $(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$ $(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$ $Total (kWh/year) = Sum(211)_{1.6.1002} = 6869.52$ (211) Space heating fuel (secondary), kWh/month $= \{[(98)m \times (201)] \} \times 100 \div (208)$ $(215)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 $		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Space	e heatin	g require	ement (c	alculate	d above)								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1308.84	1001	796.4	406.64	148.39	0	0	0	0	480.41	938.9	1342.42		
$Total (kWh/year) = Sum(211)_{1.4,10112} = 6869.52 (211)$ Space heating fuel (secondary), kWh/month $= \{[(98)m \times (201)] \} \times 100 \div (208)$ (215)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(211)m	n = {[(98)m x (20	4)] } x 1	00 ÷ (20)6)						-			(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208) (215)m= 0 0 0 0 0 0 0 0 0 0 Total (kWh/year) =Sum(215) _{1_6,10_1,12} 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1399.83	1070.59	851.76	434.91	158.7	0	0							_
$= \{ [(98)m \times (201)] \} \times 100 \div (208) \\ (215)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 $									Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	6869.52	(211)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Space	e heatin	g fuel (s	econdar	y), kWh/	month									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	= {[(98)m x (20	01)]}x1	00 ÷ (20	8)										
Water heating Output from water heater (calculated above) 219.3 193.26 202.89 181.77 178.05 158.98 152.58 167.57 167.32 188.49 199.44 213.99 Efficiency of water heater (217)m= 88.79 88.58 88.1 86.9 84.33 79.8 79.8 79.8 87.21 88.42 88.86 (217) Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219)m = 246.99 218.18 230.29 209.17 211.13 199.22 191.2 209.99 209.68 216.14 225.56 240.81	(215)m=	0	0	0	0	0	0	0		-	-	-	-		_
Output from water heater (calculated above) 219.3 193.26 202.89 181.77 178.05 158.98 152.58 167.57 167.32 188.49 199.44 213.99 Efficiency of water heater 79.8 (216) (217)m= 88.79 88.58 88.1 86.9 84.33 79.8 79.8 79.8 87.21 88.42 88.86 (217) Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219.11) 199.22 191.2 209.99 209.68 216.14 225.56 240.81									Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	-	0	(215)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		-													
Efficiency of water heater (217)m= 88.79 88.58 88.1 86.9 84.33 79.8 79.8 79.8 87.21 88.42 88.86 (217) Fuel for water heating, kWh/month (219)m= $(64)m \times 100 \div (217)m$ (219)m= 246.99 218.18 230.29 209.17 211.13 199.22 191.2 209.99 209.68 216.14 225.56 240.81	Output						450.00	450.50	407.57	407.00	400.40	100.11	0.40.00	I	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					181.77	178.05	158.98	152.58	167.57	167.32	188.49	199.44	213.99		
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$ $(219)m = 246.99$ 218.18 230.29 209.17 211.13 199.22 191.2 209.99 209.68 216.14 225.56 240.81		-	i							· · · · ·		i		79.8	
$(219)m = (64)m \times 100 \div (217)m$ $(219)m = 246.99 218.18 230.29 209.17 211.13 199.22 191.2 209.99 209.68 216.14 225.56 240.81$	· · ·					84.33	79.8	79.8	79.8	79.8	87.21	88.42	88.86		(217)
(219)m= 246.99 218.18 230.29 209.17 211.13 199.22 191.2 209.99 209.68 216.14 225.56 240.81			•												
	. ,					211.13	199.22	191.2	209.99	209.68	216.14	225.56	240.81		
			I	1		l	1	I				1		2608.34	(219)

Annual totals Space heating fuel used, main system 1		kWh/year	Г	kWh/year 6869.52]
Water heating fuel used			Ī	2608.34	1
Electricity for pumps, fans and electric keep-hot			L		•
central heating pump:		Г	30		(230c)
boiler with a fan-assisted flue		Γ	45		(230e)
Total electricity for the above, kWh/year	sum of (230a)	(230g) =	[75	(231)
Electricity for lighting			Ī	477.34	(232)
12a. CO2 emissions - Individual heating systems	including micro-CHP				
	Energy kWh/year	Emission factor kg CO2/kWh	or	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216	= [1483.82	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	563.4	(264)
Space and water heating	(261) + (262) + (263) + (264) =		Γ	2047.22	(265)
Elec <mark>tricity for pumps, fans and</mark> electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	- [247.74	(268)
Total CO2, kg/year TER =	sum o	of (265)(271) =] [[2 <mark>3</mark> 33.88	(272)
					-

		User	Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Strom Softwa	are Ver			Versio	n: 1.0.4.7	
A dalama a a		Propert	y Address	5					
Address : 1. Overall dwelling dime	neione:								
	15015.	Δι	ea(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x		.85	(2a) =	275.88	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n)		(4)], ,		
Dwelling volume		, , , <u> </u>)+(3c)+(3d)+(3e)+	.(3n) =	275.88	(5)
-									
2. Ventilation rate:		condary	other		total			m ³ per hour	
Number of chimneys	heating h	eating +	0	7 = Г	0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」 L] = [0	x	20 =	0](6b)
Number of intermittent fa	ns			л Г	0	x /	10 =	0	(7a)
Number of passive vents					0	x '	10 =	0	_](7b)
Number of flueless gas fi	res			Г	0	X	40 =	0	(7c)
				L			Air ch	anges per ho	ur
Infiltration due to chimney				Ę	0		÷ (5) =	0	(8)
If a pressurisation test has b Number of storeys in th		a, proceea to (17), otnerwise (continue tr	om (9) to (16)		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timber f	rame or 0.35	for masoni	ry constr	uction		-	0	(11)
	resent, use the value corresp	oonding to the gre	eater wall are	a (after					_
deducting areas of openir If suspended wooden f		ed) or 0.1 (se	aled) else	enter ()				0	(12)
If no draught lobby, ent								0	(12)
Percentage of windows		ripped						0	(14)
Window infiltration	5		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cub	ic metres per	hour per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(17	7) ÷ 20]+(8), othe	rwise (18) = (16)				0.15	(18)
Air permeability value applie		been done or a d	legree air pe	rmeability	is being us	sed			-
Number of sides sheltere Shelter factor	d		(20) = 1 -	[0.075 x (1	9)1 =			2	(19)
Infiltration rate incorporat	ing shelter factor		(21) = (18		•/]			0.85	(20)
Infiltration rate modified for	-		() (,(,				0.13	(21)
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 Easter (22a) - (2	2)	•							
Wind Factor (22a)m = (22 (22a)m = 1.27 1.25	2)m ÷ 4 1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				_	
.	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		c <i>tive air (</i> al ventila	-	rate for t	he appli	cable ca	se							(222)
				endix N (2	3b) = (23a	a) x Fmv (e	equation (N	√5)) , other	wise (23h) = (23a)			0.5	(23a)
								n Table 4h)) = (200)			0.5	(23b)
					Ũ		,	,) b)m i (22h) v [1 (22c)	77.35	(23c)
(24a)m=		0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	1 – (23c) 0.26]]	(24a)
												0.20	J	(210)
0) II (24b)m=								ЛV) (24b 0) m = (22)	2D)III + (2 0	230)	0	1	(24b)
								_	_	0	0	Ů	J	(210)
,					•	•		on from c c) = (22b		5 x (23h)			
(24c)m=	, <i>,</i>	0	0	0	0		0		0	0	0	0]	(24c)
		ventilatio	n or wh		e nositiv		Ventilatio	on from l	oft			-]	
								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	o) or (24	c) or (24	d) in box	(25)					
(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26		(25)
3 40	atlossa	e and he	at loss r	paramete	or:									
ELEN		Gros		Openin		Net Ar	ea	U-valu	le	AXU		k-value	<u>م</u>	\ X k
		area		m		A ,r		W/m2		(W/I	K)	kJ/m ² ·l		J/K
Win <mark>do</mark>	<mark>ws</mark> Type	e 1				5.13	x1.	/[1/(1.4)+	0.04] =	6.8				(27)
Windo ^v	<mark>ws</mark> Type	92				22.8	x1.	/[1/(1.4)+	0.04] =	30.23				(27)
Wall <mark>s</mark> ⁻	Type1	32.2	:1	0		32.21	x	0.18] = [5.8	Fil			(29)
Walls ⁻	Type2	11.6	:9	0		11.69	, x	0.18		2.1	F i		╡ ┣━	(29)
Walls ⁻		24.2	3	22.8		1.43	x	1.4		2			\dashv	(29)
Walls ⁻		10.5		0		10.55	5 X	0.16		1.65			\dashv	(29)
Walls ⁻	• •	15.3		15.39		0	x	1.4		0			\dashv	(29)
		lements		10.03	5			1.4		0	[(31)
				ffective wi	ndow H-va	94.05		ı formula 1	/[(1/Ll-valu	ie)⊥0 041 a	as aiven in	n paragraph	132	(31)
				ternal wal			atou uonig		[[# O Valu	0/10.04/0	lo given in	paragrapi	10.2	
Fabric	heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				62.18	(33)
Heat c	apacity	Cm = S(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•				construct	ion are not	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		
		ad of a dei				البراممم	/							
	-	•	,	culated u	• •		^						14.11	(36)
	abric he		are not kn	own (36) =	= 0.15 X (3	1)			(33) +	(36) =			76.29	(37)
			alculated	l monthly	/					= 0.33 × (25)m x (5)	10.23	(0,)
	Jan	Feb	Mar	Apr	, May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(38)m=	25.11	24.82	24.53	23.08	22.79	21.34	21.34	21.05	21.92	22.79	23.37	23.95	1	(38)
	ransfer o	coefficier	nt \N//K						(39)m	= (37) + (3	1 38)m	I	1	
(39)m=	101.4	101.11	100.82	99.37	99.08	97.62	97.62	97.33	98.21	99.08	99.66	100.24	1	
···</td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Average =</td> <td></td> <td></td> <td>99.29</td> <td>(39)</td>										Average =			99.29	(39)

Heat lo	ss para	meter (H	HLP), W	′m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.05	1.04	1.04	1.03	1.02	1.01	1.01	1.01	1.01	1.02	1.03	1.04		
L	r of dou					1	1		·	Average =	Sum(40)1.	₁₂ /12=	1.03	(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)
ι, Γ	-		_		_			-		_		_		
4. Wat	ter heat	ting enei	rgy requ	irement:								kWh/ye	ear:	
if TFA				[1 - exp	(-0.0003	349 x (TF	⁻ A -13.9)2)] + 0.(0013 x (⁻	TFA -13.		71		(42)
Reduce t	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.51		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г	-	-	-	ach month I				 I					I	
(44)m=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42	108.36	1100.11	
Energy c	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		1182.14	(44)
(45)m=	160.7	140.55	145.03	126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		_
lf instanta	aneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1549.97	(45)
(46)m=	24.1	21.08	21.76	18. <mark>97</mark>	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
Water s	-		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel	· · · ·	200		(47)
-				ink in dw										
Otherw	ise if no	stored			-			ombi boil	ers) ente	er '0' in (47)			
Water s	-		olorod I	ooo foot	or ia kao	wp /k///k	dov).						l	(40)
			m Table	oss facto		WII (KVVI	i/uay).					24		(48)
•				, kWh/ye	əar			(48) x (49)) –			.6		(49) (50)
•••			-	cylinder l		or is not		(-10) X (-10)	, –		1.	34		(30)
		-	factor fr ee secti	om Tabl	e 2 (kW	h/litre/da	ay)					0		(51)
	•	from Ta										0		(52)
Temper	rature fa	actor fro	m Table	2b								0		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter ((50) or ((54) in (5	55)								1.	34		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(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=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
		•		om Table								0		(58)
					,		• •	65 × (41)			-1-1			
	-		1	1	1	· · · · · ·	i	ng and a	· ·	i	, 	00.00	l	(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 ca	alculated	for eac	ch	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 rec	uired for	water	he	ating ca	alculated	for e	each mor	nth	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	225.63	199.19	209.9	6	189.28	186.25	167.	53 161.9	94	176.25	175.49	196.22	206.14	220.55		(62)
Solar DH	IW input	calculated	using A	ppe	ndix G or	Appendix	H (ne	gative qua	Intity	r) (enter '0	' if no sola	r contribu	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	Sa	and/or V	VWHRS	appl	ies, see	Арр	pendix (<u>3)</u>		_			
(63)m=	0	0	0		0	0	0	0		0	0	0	0	0		(63)
Output	from v	vater hea	ter													
(64)m=	225.63	199.19	209.9	6	189.28	186.25	167.	53 161.9	94	176.25	175.49	196.22	206.14	220.55		-
										Outp	out from wa	ater heate	er (annual)₁	12	2314.43	(64)
Heat g	ains fro	om water	heatin	g,	kWh/m	onth 0.2	5 ´ [0	.85 × (45	5)m	+ (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	105.37	93.65	100.1	6	92.31	92.28	85.0	84.2	2	88.96	87.72	95.59	97.92	103.69		(65)
inclu	de (57))m in calo	culation	n o	f (65)m	only if c	ylind	er is in th	ne d	dwelling	or hot w	ater is f	rom com	munity ł	neating	
5. Int	ernal g	ains (see	e Table	5	and 5a)):										
Metab	olic gai	ns (Table	e 5), W	att	S						-	-		-		
	Jan	Feb	Ma	r	Apr	Мау	Ju	n Ju	I	Aug	Sep	Oct	Nov	Dec		
(66)m=	162.47	162.47	162.4	7	162.47	162.47	162.	47 162.4	47	162.47	162.47	162.47	162.47	162.47		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	(calcula	ted in <i>i</i>	Apj	pendix	_, equati	ion L	9 or L9a)), al	lso see	Table 5					
(67)m=	<mark>5</mark> 5.95	49.7	40.42		30.6	22.87	19.3	31 20.8	36	27.12	36.4	46.22	53.95	57.51		(67)
Applia	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uatio	n L13 or	L13	3a), also	see Ta	ble <mark>5</mark>				
(68)m=	3 <mark>74.7</mark>	378.59	368.7	Э	347.93	321.6	296.	85 280.:	32	276.43	286.23	307.09	333.42	358.17		(68)
Cookir	g gains	s (calcula	ited in	Ap	pendix	L, equat	ion L	15 or L1	5a)	, also se	e Table	5				
(69)m=	53.96	53.96	53.96		<u>53.</u> 96	53.96	53.9	6 53.9	6	53.96	53.96	53.96	53.96	53.96		(69)
Pumps	and fa	ins gains	(Table	e 5a	a)										·	
(70)m=	0	0	0		0	0	0	0		0	0	0	0	0		(70)
Losses	s e.g. e	vaporatio	n (neg	ati	ve valu	es) (Tab	le 5)					•	•	•		
(71)m=	-108.31	-108.31	-108.3	1	-108.31	-108.31	-108	31 -108.	.31	-108.31	-108.31	-108.31	-108.31	-108.31		(71)
Water	heating	, g gains (T	able 5	5)				•	•			•	•	•		
(72)m=	141.63	139.36	134.6	3	128.21	124.03	118.	16 113. ⁻	17	119.57	121.84	128.49	136	139.37		(72)
Total i	nterna	I gains =						(66)m + (6	67)m	+ (68)m -	+ (69)m + ((70)m + (7	, 71)m + (72)	m	4	
(73)m=	680.4	675.75	651.9	5	614.85	576.62	542.	44 522.4	47	531.23	552.58	589.91	631.47	663.15]	(73)
6. So	lar gain	IS:														
Solar g	ains are	calculated	using so	olar	flux from	Table 6a a	and as	sociated e	quat	tions to co	onvert to th	e applica	ble orientat	ion.		
Orienta		Access F			Area			Flux		_	g_		FF		Gains	
		Table 6d			m²			Table 6a	a	1	able 6b	T	able 6c		(W)	_
East	0.9x	3		x	5.1	3	x	19.64		x	0.63	x	1	=	131.97	(76)
East	0.9x	3		x	5.1	3	x	38.42		x	0.63	x	1	=	258.15	(76)
East	0.9x	3		x	5.1	3	x	63.27		x	0.63	×	1	=	425.14	(76)
East	0.9x	3		x	5.1	3	x	92.28		x	0.63	×	1	=	620.04	(76)
East	0.9x	3		x	5.1	3	x	113.09		x	0.63	×	1	=	759.88	(76)

	_													
East	0.9x	3	x	5.13	3	x	115.77	×	0.63	x	1	=	777.88	(76)
East	0.9x	3	x	5.13	3	x	110.22	×	0.63	x	1	=	740.57	(76)
East	0.9x	3	x	5.13	3	x	94.68	×	0.63	x	1	=	636.14	(76)
East	0.9x	3	x	5.13	3	x	73.59	x	0.63	x	1	=	494.46	(76)
East	0.9x	3	x	5.13	3	x	45.59	x	0.63	x	1	=	306.32	(76)
East	0.9x	3	x	5.13	3	x	24.49	x	0.63	x	1	=	164.55	(76)
East	0.9x	3	x	5.13	3	x	16.15	x	0.63	x	1	=	108.52	(76)
South	0.9x	0.77	x	22.8	3	x	46.75	x	0.63	x	1	=	465.38	(78)
South	0.9x	0.77	x	22.8	3	x	76.57	x	0.63	x	1	=	762.18	(78)
South	0.9x	0.77	x	22.8	3	x	97.53	x	0.63	×	1	=	970.88	(78)
South	0.9x	0.77	x	22.8	3	x	110.23	x	0.63	x	1	=	1097.3	(78)
South	0.9x	0.77	x	22.8	3	x	114.87	x	0.63	x	1	=	1143.46	(78)
South	0.9x	0.77	x	22.8	3	x	110.55	x	0.63	x	1	=	1100.42	(78)
South	0.9x	0.77	x	22.8	3	x	108.01	x	0.63	x	1	=	1075.18	(78)
South	0.9x	0.77	x	22.8	3	x	104.89	x	0.63	x	1	=	1044.15	(78)
South	0.9x	0.77	x	22.8	3	x	101.89	x	0.63	x	1	=	1014.2	(78)
South	0.9x	0.77	x	22.8	3	x	82.59	x	0.63	x	1	=	822.08	(78)
South	0.9x	0.77	x	22.8	3	x	55.42	x	0.63	х	1	=	551.64	(78)
Sout <mark>h</mark>	0.9x	0.77	×	22.8	3	x	40.4] x	0.63	x	1	-	402.13	(78)
Sola <mark>r</mark> g	ains in ^r	watts, cal	culated	for each	month			(83)m	= Sum(74)m .	<mark>(8</mark> 2)m				
(83)m= 597.35 1020.33 1396.02 1717.34 1903.34 1878.3 1815.75 1680.29 1508.65 1128.4 716.18 510.65														(83)
Total gains – internal and solar (84)m = (73)m + (83)m , watts														
(84)m=	1277.74	1696.08 2	2047.96	2332.19	2479.96	2420	.73 2338.21	2211	.51 2061.23	1718.3	1 1347.65	1173.81		(84)
7. Me	an inter	nal tempe	rature	(heating	season)								
Temperature during heating periods in the living area from Table 9, Th1 (°C)														(85)
Utilisa	tion fac	tor for gai	ins for I	iving are	a, h1,m	(see	Table 9a)							
	Jan	n Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
(86)m=	0.94	0.83	0.68	0.51	0.37	0.2	6 0.18	0.2	2 0.33	0.58	0.86	0.95		(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)														
(87)m=	20.51	20.78	20.93	20.98	21	21	21	2'	l 21	20.97	20.77	20.44		(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)														
(88)m=	20.04	<u> </u>	20.05	20.06	20.06	20.0	<u> </u>	20.		20.06	20.06	20.05	1	(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)														
l Itilisa	tion fac	tor for aai	ing for r	wh to tea		112,111	(300 1000	, Juj					7	
r		<u> </u>	ī	r		î 👘	2 0.15	0.1	6 0.28	0.54	0.83	0.94		(89)
(89)m=	0.92	0.8	0.64	0.47	0.33	0.2		0.1		0.54	0.83	0.94		(89)
(89)m= Mean	0.92 interna	0.8	0.64 ture in t	0.47 the rest o	0.33 of dwelli	0.2	2 (follow ste	eps 3	to 7 in Tabl	e 9c)		I	J	
(89)m=	0.92	0.8	0.64	0.47	0.33	0.2	2 (follow ste		to 7 in Tabl	e 9c) 20.04	19.8	19.35		(90)
(89)m= Mean (90)m=	0.92 interna 19.44	0.8 I temperat 19.79	0.64 ture in t 19.97	0.47 the rest c 20.05	0.33 of dwelli 20.06	0.2 ing T2 20.0	2 (follow sto 8 20.08	eps 3 20.0	to 7 in Tabl 08 20.07 f	e 9c) 20.04		19.35	0.41	
(89)m= Mean (90)m=	0.92 interna 19.44	0.8 I temperat 19.79 I temperat	0.64 ture in t 19.97	0.47 the rest c 20.05	0.33 of dwelli 20.06	0.2 ing T2 20.0	2 (follow sto 8 20.08 = fLA × T1	eps 3 20.0	to 7 in Tabl 20.07 fLA) × T2	e 9c) 20.04	19.8	19.35	0.41	(90)

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

(93)m=	19.88	20.2	20.36	20.43	20.45	20.46	20.46	20.46	20.45	20.43	20.2	19.8		(93)
8. Spa	ace hea	ting requ	uirement	t										
				mperatui using Ta		ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	n:				<u> </u>	·				1	
(94)m=	0.92	0.8	0.65	0.49	0.35	0.24	0.16	0.18	0.3	0.56	0.83	0.94		(94)
Usefu	l gains,	hmGm ,	, W = (9	4)m x (84	4)m	1					1		1	
(95)m=	1173.71	1362.05	1337.05	1134.22	864.88	571.54	376.43	394.91	623.28	954.7	1121.74	1101.56		(95)
Month	ly aver	age exte	rnal tem	perature	from Ta	able 8							1	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			J	
(97)m=	1579.54	1546.48	1397.64	1145.95	866.58	571.68	376.45	394.93	623.84	973.45	1305.63	1563.66		(97)
Space	e heatin	g require	ement fo	r each n	honth, k	Wh/mon	h = 0.02	24 x [(97))m – (95)m] x (4	1)m]	
(98)m=	301.94	123.94	45.08	8.45	1.26	0	0	0	0	13.95	132.4	343.8		
L								Tota	l per year	(kWh/yeai) = Sum(9	8)15,912 =	970.81	(98)
Space	heatin	a require	ement in	kWh/m²	?/vear								10.03	(99)
					/ycai							l	10.03	
		oling rec	•											
Calcu				August.										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
r		i i i i		using 2							i	· · · · ·		(100)
(100)m=	0	0	0	0	0	917.67	722.42	739.74	0	0	0	0	i i	(100)
		tor for lo												(101)
(101)m=	0	0	0	0	0	1	1	1	0	0	0	0		(101)
		,	<u> </u>	(100)m x			700.05	700.47					1	(102)
(102) <mark>m=</mark>	0	0	0	0	0	916.32	722.05	739.17	0	0	0	0		(102)
r				for appli		i	-	i					I	(102)
(103)m=	0	0	0	0	0	2737.85		2495.2	0	0	0	0		(103)
				r month, < 3 × (98		iwelling,	continuo	ous (KVV	(h) = 0.0	24 x [(10)3)m – (102)m] x	ĸ (41)m	
(104)m=	0	0	0		0	1311.5	1430.5	1306.48	0	0	0	0	1	
(,		-	-	-	-					= Sum(_	=	4048.48	(104)
Cooled	fractio	า									area ÷ (4		0.73	(101)
		actor (Ta	able 10b)								,	0.1.0	
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
L			1			1			Tota	l = Sum((104)	=	0	(106)
Space	cooling	requirer	nent for	month =	(104)m	× (105)	× (106)r	n		,				
(107)m=	0	0	0	0	0	240.83	262.68	239.9	0	0	0	0		
L									Total	= Sum(107)	=	743.41	(107)
Space	cooling	requirer	ment in l	wh/m²/y	/ear				(107)) ÷ (4) =			7.68	(108)
9b. <u>En</u> e	ergy <u>rec</u>	quir <u>emer</u>	nts <u>– Co</u> l	mmunity	he <u>ating</u>	sc <u>heme</u>								
This pa	art is us	ed for sp	ace hea	ating, spa	ace cool	ing or wa	ater heat	•••			unity scł	neme.		
Fractio	n or spa	ace neat	from se	condary	supplen	nentary I	heating (able 1	i) 0 if n	one			0	(301)

Fraction of space heat from community system 1 - (301) =

0	(301)
1	(302)

The community scheme may obtain heat from several sou includes boilers, heat pumps, geothermal and waste heat Fraction of heat from Community boilers			the latter	(303a)
Fraction of total space heat from Community b	oilers	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table		eating system	1	(305)
Distribution loss factor (Table 12c) for commun	nity heating system		1.05	(306)
Space heating			kWh/year	_
Annual space heating requirement			970.81]
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	1019.35	(307a)
Efficiency of secondary/supplementary heating	g system in % (from Tab	ble 4a or Appendix E)	0	(308
Space heating requirement from secondary/su	pplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement If DHW from community scheme:			2314.43]
Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2430.15	(310a)
Electricity used for heat distribution	0.	01 × [(307a)(307e) + (310a)(310e)] =	34.5	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Space cooling (if there is a fixed cooling system	m, if not enter 0)	= (107) ÷ (314) =	156	(315)
Electricity for pumps and fans within dwelling (005.0	
mechanical ventilation - balanced, extract or po	ositive input from outsic		235.6	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating		(220-) + (220-) + (220-)	0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	235.6	(331)
Energy for lighting (calculated in Appendix L) 10b. Fuel costs – Community heating scheme	2		395.26	(332)
TOD. FUELCOSIS - Community heating scheme				
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.01 =	43.22	(340a)
Water heating from CHP	(310a) x	4.24 × 0.01 =	103.04	(342a)
		Fuel Price	·	-
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	20.58	(348)
Pumps and fans	(331)	13.19 × 0.01 =	31.08	(349)
Energy for lighting	(332)	13.19 × 0.01 =	52.13	(350)
Additional standing charges (Table 12)			120	(351)
Total energy cost = (340a	a)(342e) + (345)(354) =		370.05	(355)
11b. SAP rating - Community heating scheme	9			
Energy cost deflator (Table 12)			0.42	(356)

Energy cost factor (ECF) [(355) x (356)] ÷ [(4) +	45.0] =			1.1	(357)
SAP rating (section12)			8	34.71	(358)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission factor kg CO2/kWh		sions)2/year	
CO2 from other sources of space and water heating (not Cl Efficiency of heat source 1 (%) If there is CHP	HP) ' using two fuels repeat (363) to (366) for the second fue	el	91	(367a)
CO2 associated with heat source 1 [(30	07b)+(310b)] x 100 ÷ (367b) x	0	-	818.78	(367)
Electrical energy for heat distribution	[(313) x	0.52	-	17.9	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)		-	836.69	(373)
CO2 associated with space heating (secondary)	(309) x	0	-	0	(374)
CO2 associated with water from immersion heater or instar	taneous heater (312) x	0.22	-	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =			836.69	(376)
CO2 associated with space cooling	(315) x	0.52	-	80.96	(377)
CO2 associated with electricity for pumps and fans within d	welling (331)) x	0.52	-	122.28	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	-	205.14	(379)
Total CO2, kg/year sum of (376)(382) =				1245.06	(383 <mark>)</mark>
Dwelling CO2 Emission Rate (383) ÷ (4) =				12.86	(384)
El rating (section 14)				88.23	(385)
13b. Primary Energy – Community heating scheme					
	Energy kWh/year	Primary factor	P.Ene kWh/y		
Energy from other sources of appear and water besting (not		Tactor	K¥¥11/)	cai	
Energy from other sources of space and water heating (not Efficiency of heat source 1 (%) If there is CHP	vusing two fuels repeat (363) to (366) for the second fue	el	91	(367a)
Energy associated with heat source 1 [(30	07b)+(310b)] x 100 ÷ (367b) x	0	=	4624.61	(367)
Electrical energy for heat distribution	[(313) x		=	105.9	(372)
Total Energy associated with community systems	(363)(366) + (368)(372)		=	4730.51	(373)
if it is negative set (373) to zero (unless specified otherwi	ise, see C7 in Appendix C)		<u> </u>	4730.51	(373)
Energy associated with space heating (secondary)	(309) x	0	-	0	(374)
Energy associated with water from immersion heater or inst	tantaneous heater(312) x	1.22	-	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			4730.51	(376)
Energy associated with space cooling	(315) x	3.07	-	478.91	(377)
Energy associated with electricity for pumps and fans within	n dwelling (331)) x	3.07	-	723.3	(378)
Energy associated with electricity for lighting	(332))) x	3.07	-	1213.44	(379)
Total Primary Energy, kWh/year sum of (3	376)(382) =			7146.16	(383)

		User	Details:						
Assessor Name: Software Name:	Versio	n: 1.0.4.7							
		Property	Address:	6					
Address : 1. Overall dwelling dime	ansions:								
		Δre	ea(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x	r	.85	(2a) =	214.03	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)		(4)] [
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	214.03	(5)
2. Ventilation rate:									
		econdary	other		total			m ³ per hour	
Number of chimneys	heating h	eating +	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」	0	x 2	20 =	0](⁶ 0)
Number of intermittent fa			0		0	x ^	10 =	0	_(<i>02)</i> _(7a)
Number of passive vents					0	× ^	10 =	0](⁷)](7b)
Number of flueless gas fi					-		40 =		
					0			o anges per ho	(7c) ur
Infiltration due to chimne					0		÷ (5) =	0	(8)
Number of storeys in the		a, proceed to (17),	ounerwise c	onunue no	0111 (9) 10 (10)	[0	(9)
Additional infiltration	J J J J J J J J J J					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	frame or 0.35 fo	or masonr	y constr	uction		İ	0	(11)
••	resent, use the value correspondence of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s	ponding to the grea	ater wall area	a (after					-
deducting areas of openii If suspended wooden f		ed) or 0.1 (sea	ed). else	enter 0				0	(12)
If no draught lobby, en			,,					0	(13)
Percentage of windows		ripped						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	+ (15) =	İ	0	(16)
Air permeability value,	• • •	•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabil	•							0.15	(18)
Air permeability value applie Number of sides sheltere		s been done or a de	egree air pei	meability	is being us	sed	I	0	
Shelter factor	,u		(20) = 1 - [0.075 x (1	9)] =			3 0.78	(19) (20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.12	(21)
Infiltration rate modified f	-	ł					I		
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	

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	speed) =	(21a) x	(22a)m				_	
~ ' '	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
		c <i>tive air</i> al ventila	•	rate for t	he appli	cable ca	ise						0.5	(23a)
				endix N. (2	3b) = (23a	a) x Fmv (e	equation (I	N5)) , other	wise (23b) = (23a)			0.5	(23a)
								n Table 4h)		, (,			0.5	(230) (23c)
			-	-	-			HR) (24a		2h)m + (23h) 🗸 [ʻ	l _ (23c)	73.1 - 1001	(230)
(24a)m=		0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27]	(24a)
								MV) (24b				_	l	
(24b)m=				0	0	0			0	0	0	0]	(24b)
			I tract ver	L tilation (L Dr. Dositiv	L ve input v	L ventilatio	on from c	L utside		1		l	
,					•	•		c) = (22b		5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	se positiv	/e input	ventilatio	on from l	oft					
i	if (22b)n	n = 1, th	en (24d)	m = (22l	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]			1	
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
			·	· · ·	, <u>,</u>	, <u>,</u>	<u>, , ,</u>	d) in box	. ,	·		r	1	
(25)m=	0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(25)
3. He	at l <mark>osse</mark>	s and he	eat loss	oaramet	er:									
	IE NT	Gros		Openin	•	Net Ar		U-valu		AXU		k-value		AXk
		area	(m²)	m	12	A ,r	<u> </u>	W/m2		(VV/I	K)	kJ/m²·l	ĸ	kJ/K
Windo						19.95	5 X1	/[1/(1.4)+	0.04] =	26.45				(27)
Walls		23.9	94	0		23.94	4 ×	0.16		3.75			\exists	(29)
Walls -		28.7	′8	0		28.78	3 ×	0.16	=	4.51	L L			(29)
Walls -		21.6	6	19.9	5	1.71	×	1.4	= [2.39				(29)
Walls -	Type4	10.8	33	0		10.83	3 X	0.16	=	1.7				(29)
Total a	rea of e	lements	, m²			85.22	2							(31)
				effective wi nternal wal			lated using	g formula 1,	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	
			= S (A x		is and pan			(26)(30)	+ (32) =				38.81	(33)
		Cm = S(· ·	•)						.(30) + (32	2) + (32a).	(32e) =	0	(34)
			. ,	- = Cm -	- TFA) ir	n kJ/m²K				tive Value		`	250	(35)
								recisely the	indicative	values of	TMP in Ta	able 1f	200	()
can be ι	used inste	ad of a de	tailed calc	ulation.										
	-	•	,	culated	• •	•	K						12.78	(36)
	: <i>of therma</i> abric he		are not kr	own (36) =	= 0.15 x (3	1)			(33) +	(36) =			54.50	(27)
			alculator	d monthly							25)m x (5)		51.59	(37)
venua	Jan	Feb	Mar	1		Jun	Jul	Δυσ		Oct	Nov	Dec	1	
(38)m=	19.97	19.76	19.56	Apr 18.53	May 18.33	17.3	17.3	Aug 17.1	Sep 17.71	18.33	18.74	19.15		(38)
													l	()
Heat tr (39)m=	71.56	71.36	71.15	70.13	69.92	68.89	68.89	68.69	(39)m 69.3	= (37) + (3 69.92	70.33	70.74		
(00)11-	11.00	71.00	, 1.15	10.15	00.02	00.03	00.03	00.03			Sum(39)1		70.07	(39)
										- 3-	(/)			· /

Heat lo	ss para	ımeter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.95	0.95	0.95	0.93	0.93	0.92	0.92	0.91	0.92	0.93	0.94	0.94		
Numbo	r of do		nth (Tab						,	Average =	• Sum(40)1	12 /12=	0.93	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
) / L														
4. Wa	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	⁻ A -13.9)2)] + 0.(0013 x (⁻	TFA -13		36		(42)
Reduce	the annua	al average	hot water		5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.33		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г	-			ach month I		1	1	. ,					I	
(44)m=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36	1092.05	(44)
Energy c	ontent of	hot water	used - ca	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600			ım(44) ₁₁₂ = ables 1b, 1 -		1083.95	(44)
(45)m=	147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		
lf instanta	aneous w	/ater heati	ng at point	t of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =	•	1421.23	(45)
(46)m=	22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
Water s	-		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		200		(47)
				ank in dw										
			hot wate	er (this ir	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
Water s	-		olorod	oss facto	or io kno	wo (k\\/k	v/dov/)·					~ .	l	(40)
			m Table				i/uay).					24		(48) (49)
•				. ∠b e, kWh/ye	ar			(48) x (49)) =			.6		(43)
0,			•	cylinder l		or is not		(-/ (-/	, ,		'.	54		(00)
		-		rom Tabl	e 2 (kW	h/litre/da	ıy)					0		(51)
	•	from Ta	ee secti ble 2a	on 4.3								0		(52)
			m Table	2b								0	1	(52)
Energy	lost fro	m water	storage	e, kWh/y€	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter ((50) or ((54) in (5	55)	·							1.	34		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(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	ix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
			,	om Table								0		(58)
						,	. ,	65 × (41)						
, i	-					1	1	ng and a	· ·	· · · · · ·	1	22.26	l	(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		(59)

Combi	loss ca	alculated	for eac	ch	month (61)m =	(60)) ÷ 36	65 × (41)	m									
(61)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(61)
Total h	eat rec	quired for	water	he	ating ca	alculated	l fo	r eac	h month	(62)n	n =	0.85 × ((45)m	ı +	(46)m +	(57)ı	m +	(59)m + (61)m	
(62)m=	212.28	187.52	197.9	1	178.77	176.17	1:	58.83	153.88	167.0	D1	166.13	185.	31	194.24	207	.63		(62)
Solar DH	-IW input	calculated	using A	ppe	endix G or	Appendix	н (negati	ve quantity	v) (ente	er '0'	' if no sola	r contri	ibut	ion to wate	er hea	ting)		
(add a	dditiona	al lines if	FGHR	Sa	and/or V	VWHRS	ap	plies	, see Ap	pendi	хĢ	<u>3)</u>							
(63)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(63)
Output	from v	vater hea	ter				_		-				-		_				
(64)m=	212.28	187.52	197.9	1	178.77	176.17	1:	58.83	153.88	167.0	D1	166.13	185.	31	194.24	207	.63		_
										C	Dutp	out from wa	ater he	ate	r (annual)	12		2185.68	(64)
Heat g	ains fro	om water	heatin	g,	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61	I)m	n] + 0.8 >	(46))m	+ (57)m	+ (5	9)m]	
(65)m=	100.94	89.77	96.16	;	88.82	88.93	8	2.19	81.52	85.8	8	84.61	91.9	97	93.96	99.	39		(65)
inclu	ıde (57)m in calo	culation	n o	f (65)m	only if c	ylir	nder i	s in the c	dwellii	ng	or hot w	ater i	s fi	rom com	muni	ity h	eating	
5. Int	ternal g	ains (see	e Table	e 5	and 5a)):													
Metabo	olic gai	ns (Table	e 5), W	att	S														
	Jan	Feb	Ma		Apr	May		Jun	Jul	Au	g	Sep	00	ct	Nov	D	ес		
(66)m=	141.8	141.8	141.8		141.8	141.8	1	41.8	141.8	141.	8	141.8	141.	.8	141.8	141	.8		(66)
Lightin	g gains	(calcula	ted in <i>i</i>	Ap	pendix l	_, equat	ion	L9 o	r L9a), a	lso se	e T	Table 5							
(67)m=	46.56	41.35	33.63		25.46	19.03	1	6.07	17.36	22.5	7	30.29	38.4	6	44.89	47.	85		(67)
Applia	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uat	ion L	13 or L1:	3a), a	lso	see Ta	ble 5						
(68)m=	311.79	315.02	306.8 ⁻	7	289.51	267.6	24	47.01	233.25	230.0	02	238.17	255.	53	277.44	298	.03		(68)
Cookin	ng gains	s (calcula	ited in	Ap	pendix	L, equat	ior	n L15	or L15a)	, also) SE	e Table	5						
(69)m=	51.54	51.54	51.54	Ť	51.54	51.54	5	1.54	51.54	51.5	4	51.54	51.5	54	51.54	51.	54		(69)
Pumps	and fa	ans gains	(Table	e 5a	a)														
(70)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(70)
Losses	se.g. e	vaporatio	n (nec	jati	ve valu	es) (Tab	le	5)			!								
		-94.53		- T			r –	94.53	-94.53	-94.5	53	-94.53	-94.	53	-94.53	-94.	.53		(71)
		g gains (T		5)															
(72)m=	135.67		129.2	÷ r	123.36	119.53	1	14.15	109.57	115.4	43	117.52	123.	61	130.5	133	.59		(72)
Total i	nterna	l gains =						(66)	m + (67)m	+ (68)	m +	- (69)m + (ı (70)m -	+ (7	'1)m + (72)	m			
(73)m=	592.82	- -	568.5	5	537.14	504.97	4	76.03	458.99	466.8	33	484.79	516.4	41	551.63	578	.28		(73)
6. Sol	lar gain	is:											1						
Solar g	ains are	calculated	using so	olar	flux from	Table 6a	and	assoc	iated equa	tions to	o co	nvert to th	ie appl	icat	ole orientat	ion.			
Orienta		Access F	actor		Area			Flu				g_			FF			Gains	
		Table 6d			m²			Tal	ole 6a		Т	able 6b		Т	able 6c			(W)	
North	0.9x	0.77		x	19.	95	x	1	0.63	x		0.63	x		1		=	92.62	(74)
North	0.9x	0.77		x	19.	95	x	2	0.32	x		0.63	x		1		=	176.99	(74)
North	0.9x	0.77		x	19.	95	x	3	4.53	x		0.63	x		1		=	300.76	(74)
North	0.9x	0.77		x	19.	95	x	5	5.46	x		0.63	x		1		=	483.09	(74)
North	0.9x	0.77		x	19.	95	x	7	4.72	x		0.63	x	Ē	1		=	650.77	(74)

	F															_
North	0.9x	0.77	×	19	9.95	X	7	79.99	x		0.63	_ × [1	=	696.67	(74)
North	0.9x	0.77	×	19	9.95	x	7	74.68	x	(0.63	×	1	=	650.43	(74)
North	0.9x	0.77	x	19	9.95	x	5	59.25	x	(0.63	x	1	=	516.03	(74)
North	0.9x	0.77	x	19	9.95	x	4	1.52	x		0.63	×	1	=	361.61	(74)
North	0.9x	0.77	x	19	9.95	x	2	24.19	x		0.63	x	1	=	210.69	(74)
North	0.9x	0.77	x	19	9.95	x	1	3.12	x	(0.63	x [1	=	114.25	(74)
North	0.9x	0.77	x	19	9.95	x	;	8.86	x	(0.63	×	1	=	77.21	(74)
Solar g	gains in	watts, ca	alculate	d for ea	ch month	۱ <u> </u>			(83)m	= Sun	m(74)m .	(82)m				
(83)m=	92.62	176.99	300.76	483.09			96.67	650.43	516.	03	361.61	210.69	114.25	77.21		(83)
Total g	gains – i	nternal a	and sola	r (84)m	= (73)m	+ (83)m	, watts								
(84)m=	685.44	765.76	869.31	1020.23	1155.75	1	172.7	1109.42	982.	86	846.39	727.1	665.89	655.49		(84)
7. Me	ean inter	nal temp	perature	(heatin	g seasor	า)										
Temp	perature	during h	neating	periods	in the liv	ing	area	from Tab	ole 9,	Th1	(°C)				21	(85)
Utilis	ation fac	tor for g	ains for	living a	rea, h1,n	n (s	ee Ta	ble 9a)								
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ıg	Sep	Oct	Nov	Dec		
(86)m=	0.98	0.97	0.92	0.77	0.55		0.38	0.27	0.3	2	0.56	0.86	0.97	0.99		(86)
Mear	interna	temper	ature in	living a	rea T1 (f		w ste	ps 3 to 7	/ in T	able	9c)		•			
(87)m=	20.32	20.47	20.7	20.91	20.99		21	21	21		20.99	20.86	20.56	20.3		(87)
	L						, allin a	from To					1			
(88)m=	20.12	20.13	20.13	20.14	20.14	T	20.15	from Ta	20.1		2 (°C) 20.15	20.14	20.14	20.13		(88)
	L			-		1					20.13	20.14	20.14	20.13		(00)
						_		e Table	<u> </u>							(00)
(89)m=	0.98	0.96	0.9	0.73	0.51		0.33	0.22	0.2	6	0.49	0.82	0.95	0.98		(89)
Me <mark>a</mark> r	interna	l temper	ature in	the res	t of dwel	ling	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 9 <mark>c)</mark>				
(90)m=	19.25	19.46	19.77	20.05	20.13	2	20.15	20.15	20.1	15	20.14	20	19.6	19.21		(90)
											f	LA = Livi	ng area ÷ (4	4) =	0.47	(91)
Mear	n interna	l temper	ature (f	or the w	hole dwe	ellin	g) = f	LA × T1	+ (1 -	– fLA) × T2					
(92)m=	19.76	19.94	20.21	20.46	20.54	2	20.55	20.55	20.5	56	20.54	20.41	20.06	19.73		(92)
Apply	/ adjustr	nent to t	he mea	n interna	al tempe	ratu	ire fro	m Table	4e, \	where	e appro	priate				
(93)m=	19.76	19.94	20.21	20.46	20.54	2	20.55	20.55	20.5	56	20.54	20.41	20.06	19.73		(93)
8. Sp	ace hea	iting requ	uiremen	t												
				•		ned	l at ste	ep 11 of	Table	e 9b,	so that	t Ti,m=	(76)m an	d re-calo	ulate	
the u		factor fo	<u> </u>	1	1	-					0	0.1		Du	l	
Litilio	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ıg	Sep	Oct	Nov	Dec		
(94)m=	0.98	0.96	0.9	0.74	0.53		0.35	0.25	0.2	9	0.52	0.83	0.95	0.98		(94)
		hmGm					0.00	0.20	0.2	<u> </u>	0.02	0.00	0.00	0.00		()
(95)m=	669.03	732.21	781.59	757.64		4	109.7	272.39	285.	32	442.08	603.85	634.56	642.65		(95)
		age exte													l	
(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)
								I =[(39)m :	x [(93	 3)m_	(96)m]	1		I	
		1072.95	1	810.66	1	-	, 10.17	272.43	285.	<u> </u>	446.64	685.97	911.28	1098.33		(97)
Spac	e heatin	g require	ement fo	or each	month, k	Wh	/mon	th = 0.02	24 x [(97)n	n – (95))m] x (4	I1)m			
(98)m=	325.21	228.98	144.1	38.18	5.15		0	0	0		0	61.1	199.24	339.03		
	_			-												

								Tota	al per year	(kWh/year	·) = Sum(9	98)15,912 =	1340.98	(98)
Spac	e heating	g require	ement in	kWh/m²	²/year								17.86	(99)
8c. S	pace co	oling rea	quiremer	nt										
Calcu	lated for		July and	August.	See Tat	ple 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			1	1 <u> </u>				1		· · · · · · · · · · · · · · · · · · ·		Table 10)		(100)
(100)m=		0 tor for la	0	0	0	647.6	509.82	522.03	0	0	0	0		(100)
(101)m=	ation fac			0	0	0.99	1	0.99	0	0	0	0		(101)
				L (100)m >				0.00	Ů	Ŭ	ů	ů		(-)
(102)m=		0	0	0	0	642.57	508.29	518.56	0	0	0	0		(102)
Gains	s (solar g	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)			I		
(103)m=	0	0	0	0	0	1290.32	1219.24	1069.98	0	0	0	0		(103)
						lwelling,	continu	ous (kN	/h) = 0.0	24 x [(10))3)m – (102)m]>	(41)m	
•	<u> </u>		ì	< 3 × (98	Í									
(104)m=	0	0	0	0	0	466.38	528.94	410.26		0	0	0		
Cooler	d fractior	h								= Sum(co <mark>oled</mark>	,	= 4) -	1405.58 0.91	(104)
	ittency fa		able 10b)					10-	coolea	arca - (·	-, - I	0.91	
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
						7			Tota	l = Sum(104)	=	0	(106)
Spa <mark>ce</mark>	<u>co</u> oling	requir <mark>e</mark> ı	<mark>men</mark> t for	month =	: (104)m	× (105)	× (106)ı	m			-			
(107)m=	0	0	0	0	0	106.66	120.97	93.82	0	0	0	0		_
									Total	= Sum(107)	=	321.45	(107)
Spa <mark>ce</mark>	cooling	require	ment in I	<mark><wh <="" mark="">m²/</wh></mark>	/ear				(107)) ÷ (4) =			4.28	(108)
9b. En	ergy req	luiremer	nts – Co	mmunity	heating	scheme)							
								ting prov (Table 1			unity scl	heme.		
	•						•		1) 0 11 11	one		l	0	(301)
Fractic	on of spa	ice heat	from co	mmunity	y system	1 – (30	1) =						1	(302)
			-							up to four (other heat	sources; tl	ne latter	
		• •	-	nai and wa hity boilei		rom powe	r stations.	See Appe	naix C.				1	(303a)
						iloro				(2	00) v (202			
				m Comr							02) x (303	(a) =	1	(304a)
Factor	for cont	rol and	charging	, method	(Table 4	4c(3)) fo	or comm	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table '	12c) for (communi	ity heati	ng syste	m					1.05	(306)
Space	heating	9											kWh/yea	r
Annua	I space	heating	requiren	nent									1340.98	
Space	heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	1408.03	(307a)
Efficie	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/sup	plemen	itary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water	heating	l										•		
	l water h		requirem	nent									2185.68	
If DHV	V from co	ommuni	ty schen	ne:								-		

Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2294.97	(310a)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e	e)] = 37.03	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Space cooling (if there is a fixed cooling	system, if not enter 0)	= (107) ÷ (314) =	67.45	(315)
Electricity for pumps and fans within dwe mechanical ventilation - balanced, extra		e	204.72	(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) =	204.72	(331)
Energy for lighting (calculated in Append	dix L)		328.89	(332)
10b. Fuel costs – Community heating s	cheme			_
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cos £/year	t
Space heating from CHP	(307a) x	4.24 × 0.0	01 = 59.7	(340a)
Water heating from CHP	(310a) x	4.24 × 0.0	97.31	(342a)
Space cooling (community cooling syster Pumps and fans Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating s Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12) 12b. CO2 Emissions – Community heating	(331) (332) = (340a)(342e) + (345)(354) = scheme [(355) × (356)] ÷ [(4) + 45.0] = ng scheme	Fuel Price 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 13.19 × 0.0 Nh/year Emission fac Kg CO2/kWh Kg	0.3 = 0.3 = 0.3 $01 = 27$ 120 356.29 0.42 0.42 1.25 82.62 etor Emissions	(348) (349) (350) (351) (355) (355) (356) (357) (358)
CO2 from other sources of space and w		els repeat (363) to (366) for the secon	od fuol	
Efficiency of heat source 1 (%)	-		51	(367a)
CO2 associated with heat source 1	[(307b)+(310b)]		078.93	(367)
Electrical energy for heat distribution	[(313) x		= 19.22	(372)
Total CO2 associated with community sy		(366) + (368)(372)	= 898.17	(373)
CO2 associated with space heating (sec CO2 associated with water from immers				(374)
				(375)
Total CO2 associated with space and wa	-	(374) + (375) =	898.17	(376)
CO2 associated with space cooling	(315) x	0.52	= 35.01	(377)

CO2 associated with electricity for pum	os and fans within dv	velling (331)) x	0.52	= [106.25	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	= [170.7	(379)
Total CO2, kg/year	sum of (376)(382) =				1210.12	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.11	(384)
El rating (section 14)					86.5	(385)
13b. Primary Energy – Community heat	ing scheme					
		Energy kWh/year	Primary factor		Energy /h/year	
Energy from other sources of space and Efficiency of heat source 1 (%)		CHP) using two fuels repeat (363) t	o (366) for the secon	d fuel	91	(367a)
Energy associated with heat source 1	[(30	7b)+(310b)] x 100 ÷ (367b) x	0	= [4964.45	(367)
Electrical energy for heat distribution		[(313) x		= [113.68	(372)
Total Energy associated with communit	y systems	(363)(366) + (368)(3	72)	= [5078.14	(373)
if it is negative set (373) to zero (unle	ss specified otherwis	e, see C7 in Appendix	C)	[5078.14	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from imm	ersion heater or insta	antaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and	water heating	(373) + (374) + (375) =		[5078.14	(376)
Energy associated with space cooling		(31 <u>5)</u> x	3.07	=	207.08	(377)
Energy associated with electricity for pu	mps and fans within	dwelling (331)) x	3.07	=	628.49	(378)
Energy associated with electricity for lig	hting	(332))) x	3.07	=	1009.7	(379)
Total Primary Energy, kWh/yea	sum of (3	76)(382) =			6923.41	(383)

		User I	Details:						
Assessor Name: Software Name:	Stroma FSAP 2012		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
A daha a a		Property	Address:	9					
Address : 1. Overall dwelling dime	ansions.								
	11310113.	Δre	a(m²)		Av. Hei	aht(m)		Volume(m ³)	
Ground floor				(1a) x	r	85	(2a) =	383.61	(3a)
Total floor area TFA = (1)	a)+(1b)+(1c)+(1d)+(1e)+(1n)	134.6	(4)] [J
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	383.61	(5)
2. Ventilation rate:									
		econdary	other		total			m ³ per hour	
Number of chimneys	heating heating heating heating heating	eating 0 +	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」 <u>「</u>] = 「	0	x2	20 =	0	_`´´](6b)
Number of intermittent fa	ins		-	J L T	0	x^	10 =	0](7a)
Number of passive vents	i				0	x ^	10 =	0](7b)
Number of flueless gas fi	ires				0	x 4	40 =	0	(7c)
				L			Air ch	anges per ho	ur
Infiltration due to chimne				Ę	0		÷ (5) =	0	(8)
Number of storeys in the	been carried out or is intende he dwelling (ns)	a, proceea to (17),	otherwise c	ontinue fre	om (9) to (16)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	rame or 0.35 fo	or masonr	y constr	uction		-	0	(11)
	resent, use the value corresp	ponding to the grea	ter wall area	a (after			•		-
deducting areas of openii	ngs); if equal user 0.35 floor, enter 0.2 (unseale	ed) or 0.1 (seal	ed) else	enter 0				0	(12)
If no draught lobby, en			04), 0.00					0	(12)
- ,	s and doors draught str	ripped						0	(14)
Window infiltration	-		0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	- (15) =		0	(16)
Air permeability value,	q50, expressed in cubi	ic metres per h	our per so	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(17	7) ÷ 20]+(8), otherv	vise (18) = (16)				0.15	(18)
	es if a pressurisation test has	been done or a de	egree air per	meability	is being us	sed	,		٦
Number of sides sheltere Shelter factor)O		(20) = 1 - [0.075 x (1	9)] =			2	(19)
Infiltration rate incorporat	ting shelter factor		(21) = (18)		-/1			0.85	(20)
Infiltration rate modified f	-		() ()				l	0.13	(21)
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a) - (2)		ł							
Wind Factor $(22a)m = (22)$ (22a)m 1.27 1.25	2)m ÷ 4 1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		
				-					

Adjusted	d infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				_	
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		c <i>tive air (</i> al ventila	•	rate for t	he appli	cable ca	se							(000)
				endix N (2	3b) = (23a	ı) × Fmv (e	equation (I	N5)) othe	rwise (23h	(23a) = (23a)			0.5	
						or in-use fa) = (200)			0.5	
			-	-	-					2b)m + (:	22P) × [l (22a)	72.2 · 1001	25 (23c)
(24a)m=	0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29	- 100j	(24a)
										2b)m + (2		0.20	I	· · · ·
(24b)m=	0			0	0						0	0	1	(24b)
	-		-	-	_	ve input v							1	
						•				.5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,						/e input v erwise (2				0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effect	tive air	change	rate - er	nter (24a) or (24b	o) or (240	c) or (24	d) in boy	x (25)	•				
(25)m=	0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29		(25)
2.1100	4 10 0 0 0													
3. Heat	TIOSSE	s and he	eat loss r	paramete	er:									
S. Heat		s and he Gros		oaramete Openin		Net Ar	ea	U-valu		AXU		k-value	e e e e e e e e e e e e e e e e e e e	AXk
ELEMI	ENT	Gros area	s		gs	Net Ar A ,n	n²	W/m2	2K	A X U (W/ł	<)	k-value kJ/m²·ł		A X k kJ/K
	ENT	Gros area	s	Openin	gs		n²		2K		<)			
ELEMI	ENT s Type	Gros area 1	s	Openin	gs	A ,n	m² x1	W/m2	2K 0.04] =	(VV/I	<)			kJ/K
ELEMI Window	ENT rs Type rs Type	Gros area a1 2	s	Openin	gs	A ,n 5.13	n ² x1	W/m2 /[1/(1.4)+	2 K 0.04] = 0.04] =	(W//	<)			kJ/K (27)
ELEMI Window Window	ENT vs Type vs Type vs Type	Gros area a 1 a 2 a 3	s	Openin	gs	A ,n 5.13 4.85	n ² x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+	2K 0.04] = 0.04] = 0.04] =	(W/ł 6.8 6.43	<)			kJ/K (27) (27)
ELEMI Window Window Window	ENT rs Type rs Type rs Type rs Type	Gros area 2 2 3 4	s	Openin	gs	A ,n 5.13 4.85 16.25	n ² x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K 0.04] = 0.04] = 0.04] = 0.04] =	(W/ł 6.8 6.43 21.54				kJ/K (27) (27) (27)
ELEMI Window Window Window	ENT s Type s Type s Type s Type s Type	Gros area 2 2 3 4	55 (m²)	Openin	gs	A ,n 5.13 4.85 16.25 4.28	n ² x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 6.8 6.43 21.54 5.67				kJ/K (27) (27) (27) (27)
ELEMI Window Window Window Window	ENT s Type s Type s Type s Type ype1	Gros area a 1 a 2 a 3 a 4 a 5	55 5	Openin m	gs	A ,n 5.13 4.85 16.25 4.28 20.52	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 6.8 6.43 21.54 5.67 27.2				kJ/K (27) (27) (27) (27) (27)
ELEMI Window Window Window Window Walls Ty	ENT s Type s Type s Type s Type ype1 ype2	Gros area 2 1 2 2 3 4 4 5 5 <u>41.</u>	5 5	Openin m	gs 2	A ,n 5.13 4.85 16.25 4.28 20.52 41.5	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 	2:K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 6.8 6.43 21.54 5.67 27.2 7.47				kJ/K (27) (27) (27) (27) (27) (29)
ELEMI Window Window Window Window Walls Ty Walls Ty	ENT s Type s Type s Type s Type ype1 ype2 ype3	Gros area 2 1 2 2 2 3 2 4 2 5 2 1.4 2 1.4	5 4	Openin m	gs 2	A ,n 5.13 4.85 16.25 4.28 20.52 41.5 21.4	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.16	2:K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = =	(W/H 6.8 6.43 21.54 5.67 27.2 7.47 3.36				kJ/K (27) (27) (27) (27) (27) (29) (29)
ELEMI Window Window Window Window Walls Ty Walls Ty Walls Ty	ENT s Type s Type s Type s Type ype1 ype2 ype3 ype4	Gros area 2 1 2 2 2 3 4 4 2 5 4 1.5 2 1.4 2 1.4	5 5 4 2	Openin m 0 20.53	gs 2	A ,n 5.13 4.85 16.25 4.28 20.52 41.5 21.4 -4.43	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.16 1.4	2.0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = =	(W// 6.8 6.43 21.54 5.67 27.2 7.47 3.36 -6.2				kJ/K (27) (27) (27) (27) (27) (27) (29) (29) (29)
ELEMI Window Window Window Window Walls Ty Walls Ty Walls Ty Walls Ty	ENT s Type s Type s Type s Type ype1 ype2 ype3 ype4 ype5	Gros area 4 1 4 2 4 3 4 4 5 5 41.5 21.4 16.7 22.2	5 4 2 32	Openin m 0 20.53	gs 2	A ,n 5.13 4.85 16.25 4.28 20.52 41.5 21.4 -4.43 1.68	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.16 1.4 1.4	2.K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.05] =	(W// 6.8 6.43 21.54 5.67 27.2 7.47 3.36 -6.2 2.35				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29)
ELEMI Window Window Window Window Walls Ty Walls Ty Walls Ty Walls Ty Walls Ty	ENT s Type s Type s Type s Type ype1 ype2 ype3 ype4 ype5 ype6	Gros area 2 2 3 4 4 5 21.4 21.4 21.4 22.2 14.8	5 4 2 2	Openin m 0 20.53 20.55	gs 2 3	A ,n 5.13 4.85 16.25 4.28 20.52 41.5 21.4 -4.43 1.68 14.82	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.16 1.4 0.16	2:K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = <	(W// 6.8 6.43 21.54 5.67 27.2 7.47 3.36 -6.2 2.35 2.32				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29)
ELEMI Window Window Window Window Walls Ty Walls Ty Walls Ty Walls Ty Walls Ty	ENT s Type s Type s Type s Type ype1 ype2 ype3 ype4 ype5 ype6 ype7	Gros area 4 1 2 2 3 4 4 5 4 1.4 5 4 1.4 2 2.4 1 16.7 2 2.4 1 14.8 4 .2 1 5.4	5 (m ²) 5 4 1 2 32 4	Openin m 0 20.53 20.53 0 0	gs 2 3	A ,n 5.13 4.85 16.25 4.28 20.52 41.5 21.4 -4.43 1.68 14.82 4.2	n ² x1 x1 x1 x1 x1 x1 x1 x x x x x x x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.16 1.4 1.4 1.4	2.0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W// 6.8 6.43 21.54 5.67 27.2 7.47 3.36 -6.2 2.35 2.32 5.88				kJ/K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29

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

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	90.04	(33)
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	0	(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 pl can be used instead of a detailed calculation.	recisely the indicative values of TMP in Table 1f		_

Thermal bridges : S (L x Y) calculated using Appendix K

			are not kn	own (36) =	= 0.15 x (3	1)								_
Total fa	abric he	at loss								(36) =			110.38	(37)
Ventila	tion hea	at loss ca	alculated	monthl	y	r	r		(38)m	= 0.33 × (25)m x (5)	r		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	38.14	37.74	37.34	35.32	34.92	32.9	32.9	32.49	33.7	34.92	35.72	36.53		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	148.53	148.12	147.72	145.7	145.3	143.28	143.28	142.88	144.09	145.3	146.11	146.91		
										-	Sum(39)1	12 /12=	145.6	(39)
	· ·	· · · ·	HLP), W/						· · /	= (39)m ÷	· · · · · · · · · · · · · · · · · · ·	r	I	
(40)m=	1.1	1.1	1.1	1.08	1.08	1.06	1.06	1.06	1.07	1.08	1.09	1.09		
Numbe	er of day	/s in mo	nth (Tab	le 1a)						Average =	Sum(40)1.	₁₂ /12=	1.08	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ting ene	rgy requ	rement:								kWh/ye	ear:	
													1	
		ipancy, l 9 N = 1		[1 - exp	(-0.0003	849 x (TF	- -13 9)2)] + 0.()013 x (⁻	TFA -13		91		(42)
	A £ 13.9				(0.0000	, 10 x (11	10.0	/2/] • ٥		1171 10.	.0)			
								(25 x N)				3.22		(43)
		-	hot water person pe			-	-	to achieve	a water us	se target o	f			
nociniore									2					
Hot wate	Jan	Feb	Mar day for ea	Apr ach month	May	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
	_								101.15	405.00	400.44	440.54		
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	105.28	109.41	113.54	4000.04	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		1238.61	
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
										Total = Su	m(45) ₁₁₂ =	=	1624.02	(45)
If Instan			- ·				enter 0 in	boxes (46)) to (61)		1	1	I	
(46)m=	25.26 storage	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	-) includir	ia anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		200		(47)
-		. ,	and no ta				-			001		200		()
	•	-			-			ombi boil	ers) ente	er '0' in (47)			
	storage			,					,	,	,			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
Tempe	erature f	actor fro	m Table	2b							0	.6		(49)
Energy	/ lost fro	m water	⁻ storage	, kWh/ye	ear			(48) x (49)) =		1.	34		(50)
			eclared o	•										
		-	factor fr		e 2 (kW	h/litre/da	ay)					0		(51)
		from Ta	ee secti ble 2a	011 4.3								0	l	(52)
			m Table	2b								0		(52)
-			storage		ar			(47) x (51)	x (52) x (53) =		0		(54)
•••		(54) in (5	-	, . ,, y				() (C)	(/ ~ ()	- /		0 34		(54)

Water storage	e loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
If cylinder contair	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= 41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66]	(57)
Primary circui	t loss (ar	nnual) fro	om Table	e 3							0]	(58)
Primary circui	•				59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	olar wat	ter heatii	ng and a	cylinde	r thermo	stat)		_	
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26]	(59)
Combi loss ca	lculated	for each	month (61)m =	(60) ÷ 36	65 × (41))m	-				-	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat rec	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		(62)
Solar DHW input	calculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, 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= 233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		
							Outp	out from wa	ater heate	r (annual)₁	12	2388.47	(64)
Hea <mark>t gains fro</mark>	m water	heating,	kWh/m	onth 0.2	5 (0.85	× (45)m	+ (61)n	n] + 0.8 x	(<mark>46)m</mark>	+ (57)m	+ (59)m	1	
(65)m= 107.93	95.88	102.47	94.32	94.21	<mark>8</mark> 6.74	85.74	90.73	89.51	97.68	100.19	106.16		(65)
in aluda (EZ)													
in <mark>ciude</mark> (57)	m in calc	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	<mark>mu</mark> nity h	neating	
5. Internal g					ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	neating	
5. Internal g	ains (see	e Table 5	and 5a		ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
	ains (see	e Table 5	and 5a		ylinder is Jun	s in the o	dwelling Aug	or hot w Sep	ater is fr Oct	om com	munity h	heating	
5. Internal g Metabolic gai	ains (see ns (Table	Table 5), Wat	and 5a):								heating	(66)
5. Internal g Metabolic gain Jan (66)m= 174.36	ains (see ns (Table Feb 174.36	e Table 5 5), Wat Mar 174.36	and 5a ts Apr 174.36): May 174.36	Jun 174.36	Jul 174.36	Aug 174.36	Sep 174.36	Oct	Nov	Dec	heating	(66)
5. Internal g Metabolic gai	ains (see ns (Table Feb 174.36	e Table 5 5), Wat Mar 174.36	and 5a ts Apr 174.36): May 174.36	Jun 174.36	Jul 174.36	Aug 174.36	Sep 174.36	Oct	Nov	Dec	heating	(66)
5. Internal g Metabolic gain Jan (66)m= 174.36 Lighting gains (67)m= 67.57	ains (see ns (Table Feb 174.36 (calcula 60.02	5), Wat Mar 174.36 ted in Ap 48.81	Apr 174.36 ppendix 36.95	: 174.36 L, equati 27.62	Jun 174.36 ion L9 o 23.32	Jul 174.36 r L9a), a 25.2	Aug 174.36 Iso see 32.75	Sep 174.36 Table 5 43.96	Oct 174.36 55.82	Nov 174.36	Dec 174.36	heating	
5. Internal g Metabolic gai Jan (66)m= 174.36 Lighting gains	ains (see ns (Table Feb 174.36 (calcula 60.02	5), Wat Mar 174.36 ted in Ap 48.81	Apr 174.36 ppendix 36.95	: 174.36 L, equati 27.62	Jun 174.36 ion L9 o 23.32	Jul 174.36 r L9a), a 25.2	Aug 174.36 Iso see 32.75	Sep 174.36 Table 5 43.96	Oct 174.36 55.82	Nov 174.36	Dec 174.36	heating	
5. Internal g Metabolic gai (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51	ains (see rs (Table Feb 174.36 (calcula 60.02 tins (calc 457.21	 Table 5 5), Wat Mar 174.36 ted in Ap 48.81 ulated in 445.38 	and 5a ts Apr 174.36 ppendix 36.95 Append 420.18): 174.36 L, equati 27.62 dix L, eq 388.39	Jun 174.36 ion L9 of 23.32 uation L 358.5	Jul 174.36 r L9a), a 25.2 13 or L1 338.53	Aug 174.36 Iso see 32.75 3a), also 333.84	Sep 174.36 Table 5 43.96 see Ta 345.67	Oct 174.36 55.82 ble 5 370.86	Nov 174.36 65.15	Dec 174.36 69.45	heating	(67)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains	ains (see rs (Table Feb 174.36 (calcula 60.02 tins (calc 457.21	Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in A	and 5a ts Apr 174.36 ppendix 36.95 Append 420.18): 174.36 L, equati 27.62 dix L, eq 388.39 L, equat	Jun 174.36 ion L9 o 23.32 uation L 358.5 ion L15	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a)	Aug 174.36 Iso see 32.75 3a), also 333.84), also se	Sep 174.36 Table 5 43.96 9 see Ta 345.67 ee Table	Oct 174.36 55.82 ble 5 370.86 5	Nov 174.36 65.15 402.66	Dec 174.36 69.45 432.55	heating	(67)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34	ains (see rs (Table Feb 174.36 (calcula 60.02 ains (calcula 457.21 s (calcula 55.34	2 Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in A 55.34	and 5a ts Apr 174.36 ppendix 36.95 Append 420.18 ppendix 55.34): 174.36 L, equati 27.62 dix L, eq 388.39	Jun 174.36 ion L9 of 23.32 uation L 358.5	Jul 174.36 r L9a), a 25.2 13 or L1 338.53	Aug 174.36 Iso see 32.75 3a), also 333.84	Sep 174.36 Table 5 43.96 see Ta 345.67	Oct 174.36 55.82 ble 5 370.86	Nov 174.36 65.15	Dec 174.36 69.45	heating	(67) (68)
5. Internal g Metabolic gai (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa	ains (see rs (Table Feb 174.36 (calcula 60.02 ains (calcula 457.21 s (calcula 55.34	2 Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in A 55.34	and 5a ts Apr 174.36 ppendix 36.95 Appendix 420.18 ppendix 55.34 5a)): 174.36 L, equati 27.62 dix L, eq 388.39 L, equat 55.34	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a)	Aug 174.36 Iso see 32.75 3a), also 333.84), also se 55.34	Sep 174.36 Table 5 43.96 5 see Ta 345.67 2 e Table 55.34	Oct 174.36 55.82 ble 5 370.86 5 55.34	Nov 174.36 65.15 402.66 55.34	Dec 174.36 69.45 432.55 55.34	heating	(67) (68) (69)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0	ains (see ns (Table Feb 174.36 (calcula 60.02 ins (calcula 457.21 s (calcula 55.34 ns gains 0	Table 5 5), Wat Mar 174.36 ted in Ap 48.81 sulated in Ap 445.38 ated in Ap 55.34 (Table 5 0	and 5a ts Apr 174.36 ppendix 36.95 Appendix 420.18 ppendix 55.34 5a) 0): 174.36 L, equati 27.62 Jix L, equat 388.39 L, equat 55.34	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34	Aug 174.36 Iso see 32.75 3a), also 333.84), also se	Sep 174.36 Table 5 43.96 9 see Ta 345.67 ee Table	Oct 174.36 55.82 ble 5 370.86 5	Nov 174.36 65.15 402.66	Dec 174.36 69.45 432.55	heating	(67) (68)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e	ains (see rs (Table Feb 174.36 (calcula 60.02 ains (calcula 457.21 s (calcula 55.34 ns gains 0 vaporatic	Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in Ap 55.34 (Table 5 0 on (nega	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu): 174.36 L, equati 27.62 dix L, eq 388.39 L, equat 55.34 0 es) (Tab	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34 0 le 5)	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34 0	Aug 174.36 lso see 32.75 3a), also 333.84), also se 55.34	Sep 174.36 Table 5 43.96 55.34 0	Oct 174.36 55.82 ble 5 370.86 5 55.34 0	Nov 174.36 65.15 402.66 55.34	Dec 174.36 69.45 432.55 55.34 0	heating	(67) (68) (69) (70)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -116.24	ains (see Feb 174.36 (calcula 60.02 ains (calcula 457.21 s (calcula 55.34 ns gains 0 vaporatic -116.24	Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in Ap 55.34 (Table 5 0 on (negar -116.24	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu): 174.36 L, equati 27.62 Jix L, equat 388.39 L, equat 55.34	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34	Aug 174.36 Iso see 32.75 3a), also 333.84), also se 55.34	Sep 174.36 Table 5 43.96 55.34 0	Oct 174.36 55.82 ble 5 370.86 5 55.34	Nov 174.36 65.15 402.66 55.34	Dec 174.36 69.45 432.55 55.34	heating	(67) (68) (69)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -116.24 Water heating	ains (see rs (Table Feb 174.36 (calcula 60.02 ins (calcula 457.21 s (calcula 55.34 ns gains 0 vaporatic -116.24 gains (T	Table 5 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in Ap 55.34 (Table 5 0 on (negar -116.24	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu -116.24): 174.36 L, equati 27.62 dix L, equati 388.39 L, equati 55.34 0 es) (Tab -116.24	Jun 174.36 ion L9 o 23.32 uation L 358.5 ion L15 55.34 0 le 5) -116.24	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34 0 -116.24	Aug 174.36 Iso see 32.75 3a), also 333.84), also se 55.34 0 -116.24	Sep 174.36 Table 5 43.96 55.34 0 -116.24	Oct 174.36 55.82 ble 5 370.86 5 55.34 0 -116.24	Nov 174.36 65.15 402.66 55.34 0 -116.24	Dec 174.36 69.45 432.55 55.34 0 -116.24	heating	 (67) (68) (69) (70) (71)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -116.24 Water heating (72)m= 145.06	ains (see Feb 174.36 (calcula 60.02 iins (calcula 457.21 s (calcula 55.34 ns gains 0 vaporatic -116.24 gains (T 142.68	Table f 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in Ap 55.34 (Table f 0 on (negation) -116.24 Table 5) 137.73	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu): 174.36 L, equati 27.62 dix L, eq 388.39 L, equat 55.34 0 es) (Tab	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34 0 le 5) -116.24 120.47	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34 0 -116.24 115.24	Aug 174.36 lso see 32.75 3a), also 333.84), also se 55.34 0 -116.24 121.94	Sep 174.36 Table 5 43.96 5 see Ta 345.67 2 Table 55.34 0 -116.24 124.32	Oct 174.36 55.82 55.82 55.34 55.34 0 -116.24 131.29	Nov 174.36 65.15 402.66 55.34 0 -116.24 139.16	Dec 174.36 69.45 432.55 55.34 0 -116.24 142.69	heating	(67) (68) (69) (70)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -116.24 Water heating (72)m= 145.06 Total interna	ains (see Feb 174.36 (calcula 60.02 ins (calc 457.21 s (calcula 55.34 ns gains 0 vaporatio -116.24 gains (T 142.68 gains =	Table f 5), Wat Mar 174.36 ted in Ap 48.81 ulated in 445.38 ated in Ap 55.34 (Table f 0 on (negation) -116.24 Table 5) 137.73	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu -116.24): 174.36 L, equati 27.62 dix L, eq 388.39 L, equat 55.34 0 es) (Tab -116.24 126.63	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34 0 le 5) -116.24 120.47 (66)	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34 0 -116.24 115.24 m + (67)m	Aug 174.36 Iso see - 32.75 3a), also 333.84), also se 55.34 0 -116.24 121.94 + (68)m -	Sep 174.36 Table 5 43.96 > see Ta 345.67 >e Table 55.34 0 -116.24 124.32 + (69)m + (6)	Oct 174.36 55.82 ble 5 370.86 5 55.34 0 -116.24 131.29 70)m + (7	Nov 174.36 65.15 402.66 55.34 0 -116.24 139.16 1)m + (72)	Dec 174.36 69.45 432.55 55.34 0 -116.24 142.69	heating	 (67) (68) (69) (70) (71) (72)
5. Internal g Metabolic gain (66)m= 174.36 Lighting gains (67)m= 67.57 Appliances ga (68)m= 452.51 Cooking gains (69)m= 55.34 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -116.24 Water heating (72)m= 145.06	ains (see Feb 174.36 (calcula 60.02 ins (calcula 457.21 s (calcula 55.34 ns gains 0 vaporatic -116.24 gains (T 142.68 gains = 773.37	Table f 5), Wat Mar 174.36 ted in Ap 48.81 culated in 445.38 ated in Ap 55.34 (Table f 0 on (negation) -116.24 Table 5) 137.73	and 5a ts Apr 174.36 opendix 36.95 Appendix 420.18 opendix 55.34 5a) 0 tive valu -116.24): 174.36 L, equati 27.62 dix L, equati 388.39 L, equati 55.34 0 es) (Tab -116.24	Jun 174.36 ion L9 of 23.32 uation L 358.5 ion L15 55.34 0 le 5) -116.24 120.47	Jul 174.36 r L9a), a 25.2 13 or L1 338.53 or L15a) 55.34 0 -116.24 115.24	Aug 174.36 lso see 32.75 3a), also 333.84), also se 55.34 0 -116.24 121.94	Sep 174.36 Table 5 43.96 5 see Ta 345.67 2 Table 55.34 0 -116.24 124.32	Oct 174.36 55.82 55.82 55.34 55.34 0 -116.24 131.29	Nov 174.36 65.15 402.66 55.34 0 -116.24 139.16	Dec 174.36 69.45 432.55 55.34 0 -116.24 142.69	heating	 (67) (68) (69) (70) (71)

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

Orientatio		Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.52	x	10.63	x	0.63	x	1	=	95.26	(74)
North	0.9x	0.77	x	20.52	x	20.32	x	0.63	x	1	=	182.05	(74)
North	0.9x	0.77	x	20.52	x	34.53	x	0.63	x	1	=	309.35	(74)
North	0.9x	0.77	x	20.52	x	55.46	x	0.63	x	1	=	496.9	(74)
North	0.9x	0.77	x	20.52	x	74.72	x	0.63	x	1	=	669.36	(74)
North	0.9x	0.77	x	20.52	x	79.99	x	0.63	x	1	=	716.57	(74)
North	0.9x	0.77	x	20.52	x	74.68	x	0.63	x	1	=	669.01	(74)
North	0.9x	0.77	x	20.52	x	59.25	x	0.63	x	1	=	530.78	(74)
North	0.9x	0.77	x	20.52	x	41.52	x	0.63	x	1	=	371.94	(74)
North	0.9x	0.77	x	20.52	x	24.19	x	0.63	x	1	=	216.71	(74)
North	0.9x	0.77	x	20.52	x	13.12	x	0.63	x	1	=	117.52	(74)
North	0.9x	0.77	x	20.52	x	8.86	x	0.63	x	1	=	79.42	(74)
East	0.9x	2	x	5.13	x	19.64	x	0.63	x	1	=	87.98	(76)
East	0.9x	1	x	4.85	x	19.64	x	0.63	x	1	=	41.59	(76)
East	0.9x	2	x	5.13	x	38.42	x	0.63	x	1	=	172.1	(76)
East	0.9x		x	4.85	×	38.42	х	0.63	Х	1	=	81.35	(76)
East	0.9x	2	x	5.13	x	63.27	x	0.63	x	1	=	283.43	(76)
East	0.9x	1	x	4.85	x	63.27	×	0.63	x	1	=	133.98	(76)
East	0.9x	2	x	5.13	x	92.28	x	0.63	x	1	=	413.36	(76)
East	0.9x	1	x	4.85	x	92.28	х	0.63	x	1	=	195.4	(76)
East	0.9x	2	x	5.13	x	113.09	x	0.63	x	1	=	5 <mark>06.59</mark>	(76)
East	0.9x	1	x	4.85	x	113.09	x	0.63	x	1	=	2 <mark>39.47</mark>	(76)
East	0.9x	2	x	5.13	x	115.77	x	0.63	x	1	=	518.58	(76)
East	0.9x	1	x	4.85	x	115.77	x	0.63	x	1	=	245.14	(76)
	0.9x	2	x	5.13	x	110.22	x	0.63	x	1	=	493.71	(76)
	0.9x	1	x	4.85	x	110.22	x	0.63	x	1	=	233.38	(76)
	0.9x	2	x	5.13	x	94.68	x	0.63	x	1	=	424.09	(76)
	0.9x	1	x	4.85	x	94.68	x	0.63	x	1	=	200.47	(76)
East	0.9x	2	x	5.13	x	73.59	x	0.63	x	1	=	329.64	(76)
	0.9x	1	x	4.85	x	73.59	x	0.63	x	1	=	155.82	(76)
	0.9x	2	x	5.13	x	45.59	x	0.63	x	1	=	204.21	(76)
	0.9x	1	x	4.85	x	45.59	x	0.63	x	1	=	96.53	(76)
	0.9x	2	x	5.13	x	24.49	x	0.63	x	1	=	109.7	(76)
	0.9x	1	x	4.85	x	24.49	x	0.63	x	1	=	51.85	(76)
_	0.9x		x	5.13	x	16.15	x	0.63	x	1	=	72.35	(76)
. .	0.9x		x	4.85	x	16.15	x	0.63	x	1	=	34.2	(76)
	0.9x	-	x	16.25	x	46.75	x	0.63	x	1	=	331.69	(78)
_ ·	0.9x		x	4.28	x	46.75	x	0.63	x	1	=	87.36	(78)
South	0.9x	0.77	x	16.25	×	76.57	x	0.63	x	1	=	543.22	(78)

South 0.9x 0.77 x 4.28 x 75.57 x 0.63 x 1 = 143.08 (76) South 0.9x 0.77 x 18.25 x 97.53 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 97.53 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 110.22 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 110.22 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 110.22 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 110.22 x 0.63 x 1 = 722.07 (78) South 0.9x 0.77 x 4.28 x 110.25 x 0.63 x 1 = 724.26 (78) South 0.9x 0.77 x 4.28 x 110.25 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 110.55 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 110.55 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 110.55 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 110.55 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 10.65 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 10.66 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 10.68 x 0.63 x 1 = 724.22 (78) South 0.9x 0.77 x 4.28 x 10.68 x 0.63 x 1 = 724.23 (78) South 0.9x 0.77 x 4.28 x 10.68 x 0.63 x 1 = 724.23 (78) South 0.9x 0.77 x 4.28 x 10.48 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.48 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.88 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.89 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.25 x 4.04 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x 4.28 x 10.24 x 0.28 x 0.28 x 0.63 x 1 = 724.24 (78) South 0.9x 0.77 x		-								-			_					_	
South $0.3\times$ 0.77 × 4.28 × 0.75 × 0.63 × 1 = 1222 (73) South $0.3\times$ 0.77 × 4.28 × 110.23 × 0.63 × 1 = 782.07 (73) South $0.3\times$ 0.77 × 4.28 × 110.23 × 0.63 × 1 = 205.89 (73) South $0.3\times$ 0.77 × 4.28 × 114.87 × 0.63 × 1 = 205.89 (73) South $0.3\times$ 0.77 × 4.28 × 114.87 × 0.63 × 1 = 204.68 (76) South $0.3\times$ 0.77 × 4.28 × 110.55 × 0.63 × 1 = 204.67 (73) South $0.3\times$ 0.77 × 4.28 × 110.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 110.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 110.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 100.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 100.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 100.55 × 0.63 × 1 = 204.57 (73) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 204.53 (75) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 204.53 (75) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 166.01 (74) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 166.01 (75) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 166.21 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.39 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.39 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 4.28 × 104.89 × 0.63 × 1 = 164.32 (76) South $0.3\times$ 0.77 × 16.25 × 40.4 × 0.63 × 1 = 164.30 (76) South $0.3\times$ 0.77 × 16.25 × 160.77 (78) South $0.3\times$ 0.77 ×	South	0.9x	0.77	x	4.2	28	x	7	6.57	x		0.63	x	1		=	143.08	(78)	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	South	0.9x	0.77	x	16.	.25	x	9	7.53	x		0.63	x	1		=	691.96	(78)	
South 0.07 × 4.28 × 10.02 × 0.063 × 1 = 205.88 (7) South 0.37 × 14.23 × 10.63 × 1 = 205.88 (7) South 0.37 × 14.23 × 114.87 × 0.63 × 1 = 205.86 (7) South 0.37 × 14.23 × 110.55 × 0.63 × 1 = 206.57 (7) South 0.37 × 16.25 × 100.61 × 0.63 × 1 = 206.57 (7) South 0.38 0.77 × 16.25 × 104.89 0.63 × 1 = 206.57 (7) South 0.38 0.77 × 14.28 × 104.89 0.63 × 1 = 744.18 (7) South 0.38 0.77 × 16.25 × 104.89 0.63 × 1	South	0.9x	0.77	x	4.2	28	x	9	7.53	x		0.63	x	1		=	182.25	(78)	
South 0.9×0.77 × 10.25 × 114.87 × 0.63 × 1 = 144.65 (78) South 0.9×0.77 × 16.25 × 114.87 × 0.63 × 1 = 764.29 (78) South 0.9×0.77 × 16.25 × 110.55 × 0.63 × 1 = 764.29 (78) South 0.9×0.77 × 16.25 × 100.65 × 0.63 × 1 = 764.39 (78) South 0.9×0.77 × 16.25 × 100.61 × 0.63 × 1 = 764.3 (78) South 0.9×0.77 × 16.25 × 100.61 × 0.63 × 1 = 764.3 (78) South 0.9×0.77 × 16.25 × 100.61 × 0.63 × 1 = 764.3 (78) South 0.9×0.77 × 16.25 × 104.89 × 0.63 × 1 = 722.84 (78) South 0.9×0.77 × 16.25 × 101.89 × 0.63 × 1 = 724.41 (78) South 0.9×0.77 × 16.25 × 101.89 × 0.63 × 1 = 722.84 (78) South 0.9×0.77 × 16.25 × 101.89 × 0.63 × 1 = 722.84 (78) South 0.9×0.77 × 16.25 × 101.89 × 0.63 × 1 = 196.01 (78) South 0.9×0.77 × 14.28 × 104.89 × 0.63 × 1 = 196.21 (78) South 0.9×0.77 × 14.28 × 104.89 × 0.63 × 1 = 190.38 (78) South 0.9×0.77 × 4.28 × 104.89 × 0.63 × 1 = 100.38 (78) South 0.9×0.77 × 4.28 × 104.89 × 0.63 × 1 = 100.38 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 100.38 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 100.38 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) South 0.9×0.77 × 4.28 × 55.42 × 0.63 × 1 = 75.49 (78) Colar canse investic calculated for each month contractioned to a 100000000000000000000000000000000000	South	0.9x	0.77	x	16.	.25	x	1	10.23	x		0.63	x	1		=	782.07	(78)	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	South	0.9x	0.77	x	4.2	28	x	1	10.23	x		0.63	×	1		=	205.98	(78)	
South 0.82 0.77 × 10.25 × 110.55 × 0.63 × 1 = 764.29 (76) South 0.92 0.77 × 4.28 × 110.55 × 0.63 × 1 = 206.57 (78) South 0.92 0.77 × 14.26 × 106.01 × 0.63 × 1 = 206.57 (78) South 0.92 0.77 × 14.26 × 104.89 × 0.63 × 1 = 206.37 (78) South 0.92 0.77 × 4.28 × 104.89 × 0.63 × 1 = 106.01 (78) South 0.92 0.77 × 4.28 × 101.89 × 0.63 × 1 = 303.16 (78) South 0.92 0.77 × 4.28 × 56.42 × 0.63 × 1 = 56.54 (76) South 0.92 0.77 ×	South	0.9x	0.77	x	16.	.25	x	1	14.87	x		0.63	x	1		=	814.96	(78)	
South 0.9, 0.77 × 4.28 × 110.55 × 0.63 × 1 = 206.57 (7) South 0.9, 0.77 × 162.5 × 108.01 × 0.63 × 1 = 766.3 (7) South 0.9, 0.77 × 162.5 × 104.89 × 0.63 × 1 = 766.3 (7) South 0.9, 0.77 × 4.28 × 104.89 × 0.63 × 1 = 744.18 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 742.47 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 742.47 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.37 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 100.44 × 0.63 × 1 = 1980.38 (7) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 75.49 (78) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28 × 4.04 × 0.63 × 1 = 286(17) South 0.9, 0.77 × 4.28	South	0.9x	0.77	x	4.2	28	x	1	14.87	x		0.63	x	1		=	214.65	(78)	
South 0.9, 0.77 × 16.25 × 108.01 × 0.63 × 1 = 766.0 (78) South 0.9, 0.77 × 4.28 × 108.01 × 0.63 × 1 = 744.18 (78) South 0.9, 0.77 × 4.28 × 104.89 × 0.63 × 1 = 744.18 (78) South 0.9, 0.77 × 4.28 × 104.89 × 0.63 × 1 = 722.84 (78) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 722.84 (78) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 190.03 (78) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 190.38 (78) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 190.38 (78) South 0.9, 0.77 × 4.28 × 101.89 × 0.63 × 1 = 190.38 (78) South 0.9, 0.77 × 4.28 × 82.59 × 0.63 × 1 = 190.36 (78) South 0.9, 0.77 × 4.28 × 82.59 × 0.63 × 1 = 193.55 (78) South 0.9, 0.77 × 4.28 × 82.59 × 0.63 × 1 = 193.56 (78) South 0.9, 0.77 × 4.28 × 65.42 × 0.63 × 1 = 193.56 (78) South 0.9, 0.77 × 4.28 × 40.4 × 0.63 × 1 = 193.65 (78) South 0.9, 0.77 × 4.28 × 40.4 × 0.63 × 1 = 286.61 (78) South 0.9, 0.77 × 4.28 × 40.4 × 0.63 × 1 = 286.61 (78) South 0.9, 0.77 × 4.28 × 40.4 × 0.63 × 1 = 76.49 (78) South 0.9, 0.77 × 4.28 × 162.5 × 40.4 × 0.63 × 1 = 76.49 (78) South 0.9, 0.77 × 4.28 × 162.5 × 10.4 (209.53) (770.8) (257.69 (75.78) 548.06 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m $\frac{1422.48}{1422.48}$ 199.517 2346.34 279.53 3101.13 308.91 2956.68 2697.53 2380.41 129.12 1496.21 1306.21 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (86)m $\frac{0.98}{0.98}$ 0.8 0.81 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9, Th2 (°C) (89)m $\frac{0.97}{0.9}$ 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling from Table 9, Th2 (°C) (80)m $\frac{0.97}{0.9}$ 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling the table 9a) (80)m $\frac{0.77}{0.9}$ 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89)	South	0.9x	0.77	x	16.	.25	x	1	10.55	x		0.63	x	1		=	784.29	(78)	
South 0.9k 0.77 × 4.28 × 100.01 × 0.63 × 1 = 0.183 (7) South 0.9k 0.77 × 4.28 × 104.89 × 0.63 × 1 = 744.18 (7) South 0.9k 0.77 × 4.28 × 104.89 × 0.63 × 1 = 744.18 (7) South 0.9k 0.77 × 4.28 × 104.89 × 0.63 × 1 = 196.01 (7) South 0.9k 0.77 × 16.25 × 101.89 × 0.63 × 1 = 192.44 (7) South 0.9k 0.77 × 16.25 × 101.89 × 0.63 × 1 = 192.44 (7) South 0.9k 0.77 × 16.25 × 101.89 × 0.63 × 1 = 192.44 (7) South 0.9k 0.77 × 16.25 × 101.89 × 0.63 × 1 = 192.44 (7) South 0.9k 0.77 × 16.25 × 101.89 × 0.63 × 1 = 192.56 (7) South 0.9k 0.77 × 16.25 × 102.8 × 100.8 × 0.63 × 1 = 193.16 (7) South 0.9k 0.77 × 16.25 × 102.8 × 100.8 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 103.55 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 104.4 × 0.63 × 1 = 75.49 (7) South 0.9k 0.77 × 16.25 × 100.4 × 0.98 (8) Mean internal and solar (84/m = (7)m + (83)m , watts (84/m = 142.84 185.17 234.34 275.3 310.113 306.91 295.68 287.53 238.04 192.91 249.21 196.21 196.21 (6) (6)m 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (6) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9.0 (6)m 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (6) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9.0 (6)m 0.97 0.9 0.70 0.77 0.37 0.30 0.22 0.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00 20.0	South	0.9x	0.77	x	4.2	28	x	1	10.55	x		0.63	x	1		=	206.57	(78)	
South 0.9 0.77 × 16.25 × 104.89 × 0.63 × 1 = 772.44.18 (78) South 0.9 0.77 × 16.25 × 101.86 × 0.63 × 1 = 722.84 (78) South 0.9 0.77 × 16.25 × 101.89 × 0.63 × 1 = 722.84 (78) South 0.9 0.77 × 16.25 × 82.59 × 0.63 × 1 = 190.38 (78) South 0.9 0.77 × 16.25 × 82.59 × 0.63 × 1 = 154.32 (78) South 0.9 0.77 × 16.25 × 82.59 × 0.63 × 1 = 154.32 (78) South 0.9 0.77 × 16.25 × 65.42 × 0.63 × 1 = 154.32 (78) South 0.9 0.77 × 16.25 × 65.42 × 0.63 × 1 = 154.32 (78) South 0.9 0.77 × 16.25 × 65.42 × 0.63 × 1 = 154.32 (78) South 0.9 0.77 × 16.25 × 40.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 14.28 × 65.42 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 10.4 × 0.63 × 1 = 286.61 (78) South 0.9 0.77 × 12.5 × 0.77 × 12.5 × 0.77 × 0.2 (12.7.80 775.78 5.48.06 (83) 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) (8)m 0.8 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (8)m 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.20 2.002 2.001 2.001 (68) Mean internal temperature in the rest of dwelling, h2,m (see Table 9a) (8)m 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.57 0.52 0.98 (89) Mean internal temperature in the rest of dwelling, T2 (follow steps 3 to 7 in Table 9c) (9	South	0.9x	0.77	x	16.	.25	x	10	08.01	x		0.63	x	1		=	766.3	(78)	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	South	0.9x	0.77	x	4.2	28	x	10	08.01	x		0.63	x	1		=	201.83	(78)	
South 0.00 0.07 x 102 x 101.89 x 0.00 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <td>South</td> <td>0.9x</td> <td>0.77</td> <td>x</td> <td>16.</td> <td>.25</td> <td>x</td> <td>10</td> <td>04.89</td> <td>x</td> <td></td> <td>0.63</td> <td>x</td> <td>1</td> <td></td> <td>=</td> <td>744.18</td> <td>(78)</td>	South	0.9x	0.77	x	16.	.25	x	10	04.89	x		0.63	x	1		=	744.18	(78)	
South 0.8x 0.77 × 4.28 × 101.89 × 0.63 × 1 = 190.38 (78) South 0.9x 0.77 × 4.28 × 82.59 × 0.63 × 1 = 190.38 (78) South 0.9x 0.77 × 4.28 × 82.59 × 0.63 × 1 = 190.38 (78) South 0.9x 0.77 × 4.28 × 55.42 × 0.63 × 1 = 190.35 (78) South 0.9x 0.77 × 4.28 × 55.42 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 × 40.4 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 × 40.4 × 0.63 × 1 = 286.61 (78) South <td< td=""><td>South</td><td>0.9x</td><td>0.77</td><td>x</td><td>4.2</td><td>28</td><td>x</td><td>10</td><td>04.89</td><td>x</td><td></td><td>0.63</td><td>×</td><td>1</td><td></td><td>=</td><td>196.01</td><td>(78)</td></td<>	South	0.9x	0.77	x	4.2	28	x	10	04.89	x		0.63	×	1		=	196.01	(78)	
South $0.3x$ 0.77 x 16.25 x 0.63 x 1 $=$ 565.91 (78) South $0.3x$ 0.77 x 4.28 x 82.59 x 0.63 x 1 $=$ 565.91 (78) South $0.3x$ 0.77 x 4.28 x 55.42 x 0.63 x 1 $=$ 103.55 (78) South $0.9x$ 0.77 x 4.28 x 5.42 x 0.63 x 1 $=$ 103.55 (78) South $0.9x$ 0.77 x 4.28 40.4 x 0.63 x 1 $=$ 286.61 (78) x 10.63 x 1 $=$ 286.61 (78) x 10.63 x 1 $=$ 286.61 170.62 1257.68 775.78 548.06 (63) 101.13 208.61 10.82 106.21 1006.21 (64) 1422.48 </td <td>South</td> <td>0.9x</td> <td>0.77</td> <td>x</td> <td>16.</td> <td>.25</td> <td>x</td> <td>10</td> <td>01.89</td> <td>x</td> <td></td> <td>0.63</td> <td>×</td> <td>1</td> <td></td> <td>=</td> <td>722.84</td> <td>(78)</td>	South	0.9x	0.77	x	16.	.25	x	10	01.89	x		0.63	×	1		=	722.84	(78)	
South 0.5x 0.5x 0.63 x 1 = 154.32 (78) South 0.5x 0.77 x 4.28 x 82.59 x 0.63 x 1 = 154.32 (78) South 0.5x 0.77 x 4.28 x 55.42 x 0.63 x 1 = 103.55 (78) South 0.9x 0.77 x 4.28 x 55.42 x 0.63 x 1 = 286.61 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 286.61 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 286.61 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 286.61 (78) 0.63 x 1 = 286.61 (78) Solar gains in watts, calculated for each month	South	0.9x	0.77	x	4.2	28	x	10	01.89	x		0.63	×	1		=	190.38	(78)	
South 0.97 x 16.25 x 55.42 x 0.63 x 1 = 393.16 (78) South 0.97 x 16.25 x 55.42 x 0.63 x 1 = 393.16 (78) South 0.97 x 16.25 x 55.42 x 0.63 x 1 = 286.61 (78) South 0.97 x 16.25 x 4.28 x 0.63 x 1 = 286.61 (78) South 0.97 x 4.28 x 0.63 x 1 = 76.49 (76) Solar gains in watts, calculated for each month (83)m= 643.87 112.8 1600.97 2093.71 2445.04 2471.16 2364.24 2955.63 770.62 1257.69 775.78 548.06 (83) Total gains - internal and solar (84/m = (73)m + (83)m, watts (84)m= 1492.41 1306.21 (84) 64)m= 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 2566	South	0.9x	0.77	×	16.	.25	x	8	2.59	x		0.63	×	1		=	585.91	(78)	
South 0.9x 0.77 x 4.28 x 55.42 x 0.63 x 1 = 103.55 (78) South 0.9x 0.77 x 4.28 x 55.42 x 0.63 x 1 = 286.61 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 286.61 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 75.49 (78) South 0.9x 0.77 x 4.28 40.4 x 0.63 x 1 = 75.49 (78) South 0.9x 0.77 x 4.45.04 2471.16 296.53 170.62 1257.69 75.78 548.06 (83) Total gains - internal and solar (84)m = (73)m + (83)m, watts (84)m= 1495.17 2346.34 2795.3 3101.13 308.91 296.68 2697.53 2398.04 192.91 1496.21 1306.21 (84)	South	0.9x	0.77	x	4.2	28	x	8	2.59	x		0.63	×	1		=	154.32	(78)	
South 0.9x 0.77 × 16.25 × 40.4 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 40.4 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 40.4 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 40.4 × 0.63 × 1 = 286.61 (78) South 0.9x 0.77 × 4.28 40.4 × 0.63 × 1 = 75.49 (78) South 0.9x 0.77 × 4.28 40.4 × 0.63 × 1 = 75.49 (78) (8)m= 143.87 1121.8 1600.97 2093.71 244.504 2471.16 286.42 2095.53 1770.62 125.769 775.78 548.06 (63) Total gains - internal and solar (84)m = (73)m + (83)m , watts <td>Sout<mark>h</mark></td> <td>0.9x</td> <td>0.77</td> <td>x</td> <td>16.</td> <td>.25</td> <td>X</td> <td>5</td> <td>5.42</td> <td>x</td> <td></td> <td>0.63</td> <td>x</td> <td>1</td> <td></td> <td>=</td> <td>393.16</td> <td>(78)</td>	Sout <mark>h</mark>	0.9x	0.77	x	16.	.25	X	5	5.42	x		0.63	x	1		=	393.16	(78)	
South w 0.9x $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ $1 + 22.42$ 1 + 22.42 1 + 22.42 <td>Sout<mark>h</mark></td> <td>0.9x</td> <td>0.77</td> <td>×</td> <td>4.2</td> <td>28</td> <td>x</td> <td>5</td> <td>5.42</td> <td>x</td> <td></td> <td>0.63</td> <td>x</td> <td>1</td> <td></td> <td>=</td> <td>103.55</td> <td>(78)</td>	Sout <mark>h</mark>	0.9x	0.77	×	4.2	28	x	5	5.42	x		0.63	x	1		=	103.55	(78)	
Solar gains in watts, calculated for each month (83)m = 5un(74)m(82)m (83)m = 643.87 1121.8 1600.97 2093.71 2445.04 2471.16 2364.24 2095.53 1770.62 1257.69 775.78 548.06 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 2956.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Calculated for each month (73)m + (83)m , watts (84)m = 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 2956.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Calculated for each month (84)m = (73)m + (83)m , watts Calculated for each month (83)m , watts Calculated for each month (84)m = (73)m + (83)m , watts Calculated for each month (73)m + (83)m , watts Calculated for each month (73)m + (83)m , watts Calculated for each month (84)m = (73)m + (83)m , watts	Sout <mark>h</mark>	0.9x	0.77	×	16.	.25	х	4	40.4	i 🖌		0.63	x	1		=	286.61	(78)	
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 643.87 1121.8 1600.97 2093.71 2445.04 2471.16 2364.24 2095.53 1770.62 1257.69 775.78 548.06 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 2956.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Chean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (86)m = 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean Apr May Jun Jul Aug Sep Oct	Sout <mark>h</mark>	0.9x	0.77	×	4.2	28	x		40.4	x		0.63	x	1		=	75.49	(78)	
(83)m 643.87 1121.8 1600.97 2093.71 2445.04 2471.16 2364.24 2095.53 1770.62 1257.69 775.78 548.06 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 295.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Colspan=14: 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 295.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Colspan=14: Colspan=14: Colspa=14: Colspa=14: <td colsp<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td>-</td><td></td><td></td><td>I</td><td></td><td></td></td>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>I</td> <td></td> <td></td>										1			-			I		
(83)m 643.87 1121.8 1600.97 2093.71 2445.04 2471.16 2364.24 2095.53 1770.62 1257.69 775.78 548.06 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 295.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Colspan=14: 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 295.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) Colspan=14: Colspan=14: Colspa=14: Colspa=14: <td colsp<="" td=""><td>Solar o</td><td>ains in</td><td>watts, ca</td><td>Iculated</td><td>for eac</td><td>h month</td><td>1</td><td></td><td></td><td>(83)m</td><td>ı = Su</td><td>m(74)<mark>m</mark></td><td>(82)m</td><td></td><td></td><td></td><td></td><td></td></td>	<td>Solar o</td> <td>ains in</td> <td>watts, ca</td> <td>Iculated</td> <td>for eac</td> <td>h month</td> <td>1</td> <td></td> <td></td> <td>(83)m</td> <td>ı = Su</td> <td>m(74)<mark>m</mark></td> <td>(82)m</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Solar o	ains in	watts, ca	Iculated	for eac	h month	1			(83)m	ı = Su	m(74) <mark>m</mark>	(82)m					
(84)m= 1422.48 1895.17 2346.34 2795.3 3101.13 3086.91 2956.68 2697.53 2398.04 1929.12 1496.21 1306.21 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.23 20.55 20.81 20.99 21 21 21 20.92 20.56 20.16 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20 20 20.02 20.02 20.03 20.03 20.02 20.02 20.01 (88) (89)m= (89)m= (89)m=							-	471.16	2364.24	2095	5.53	1770.62	1257.6	9 775.78	548.	06		(83)	
Tender form a from a	Total g	ains – i	nternal a	nd sola	r (84)m =	= (73)m	+ (83)m	, watts										
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) (86)m= $Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.23 20.55 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.93 0.89 (89) (90) 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 <$	(84)m=	1422.48	1895.17	2346.34	2795.3	3101.13	3 30	086.91	2956.68	2697	7.53	2398.04	1929.1	2 1496.21	1306	.21		(84)	
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) (86)m= $Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 0.98 0.92 0.8 0.61 0.43 0.3 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.23 20.55 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 20.02 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.93 0.89 (89) (90) 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 <$	7. Me	an inter	nal temp	erature	(heating	seaso	า)				-	·			-				
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) (86)m= 0.98 0.92 0.8 0.61 0.43 0.21 0.24 0.41 0.72 0.94 0.98 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (88)m= 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 <th colsp<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>area</td><td>from Tab</td><td>ole 9</td><td>, Th1</td><td>(°C)</td><td></td><td></td><td></td><td></td><td>21</td><td>(85)</td></th>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>area</td> <td>from Tab</td> <td>ole 9</td> <td>, Th1</td> <td>(°C)</td> <td></td> <td></td> <td></td> <td></td> <td>21</td> <td>(85)</td>								area	from Tab	ole 9	, Th1	(°C)					21	(85)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Utilisa	ation fac	tor for ga	ains for	living are	ea, h1,r	n (s	ee Ta	ble 9a)			. ,				l			
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) $(87)m=$ 20.23 20.55 20.81 20.96 20.99 21 21 21 21 20.92 20.56 20.16 (87)Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) $(88)m=$ 20 20 20.02 20.02 20.03 20.03 20.03 20.02 20.02 20.01 20.01 (88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) $(89)m=$ 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89)Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) $(90)m=$ 19.01 19.45 19.79 19.97 20.01 20.03 20.03 20.02 19.94 19.49 18.93 (90)		Jan	Feb	Mar	Apr	May	Ì	Jun	Jul	A	ug	Sep	Oct	Nov	De	ec			
(87)m= 20.23 20.55 20.81 20.96 20.99 21 21 21 21 20.92 20.56 20.16 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20 20 20.02 20.02 20.03 20.03 20.02 20.02 20.01 20.01 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (90) (90) (90) (90) (90) (90)	(86)m=	0.98	0.92	0.8	0.61	0.43		0.3	0.21	0.2	24	0.41	0.72	0.94	0.9	8		(86)	
(87)m= 20.23 20.55 20.81 20.96 20.99 21 21 21 21 20.92 20.56 20.16 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20 20 20.02 20.02 20.03 20.03 20.02 20.02 20.01 20.01 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (90) (90) (90) (90) (90) (90)	Mean	interna	l temper:	ature in	living ar	ea T1 (f		w ste	ns 3 to 7	r 7 in T	ahle	9c)		-					
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) $(88)m=$ 202020.0220.0220.0320.0320.0220.0220.0120.01 $(88)m=$ 20202020.0220.0220.0320.0320.0220.0220.0120.01 $(89)m=$ 0.970.90.760.570.390.250.170.190.360.670.920.98Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)(89)(90)(90)			<u> </u>			<u> </u>	T		i	-			20.92	20.56	20.1	16		(87)	
(88)m= 20 20 20.02 20.02 20.03 20.03 20.03 20.02 20.02 20.01 20.01 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (90) (90) (90) (90) (90)			المسلم		l Lariada i		 6 al	. a III in a	(L				I				
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) 19.01 19.45 19.79 19.97 20.01 20.03 20.03 20.02 19.94 19.49 18.93 (90)			r – T		1	-	-		r	r		<u> </u>	20.02	20.01	20.0	11		(88)	
(89)m= 0.97 0.9 0.76 0.57 0.39 0.25 0.17 0.19 0.36 0.67 0.92 0.98 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.01 19.45 19.79 19.97 20.01 20.03 20.03 20.02 19.94 19.49 18.93 (90)			II				_				03	20.02	20.02	20.01	20.0	51		(00)	
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.01 19.45 19.79 19.97 20.01 20.03 20.03 20.02 19.94 19.49 18.93 (90)			<u> </u>		1	<u> </u>	-		r	r Ó		r						(00)	
(90)m= 19.01 19.45 19.79 19.97 20.01 20.03 20.03 20.03 20.02 19.94 19.49 18.93 (90)	(89)m=	0.97	0.9	0.76	0.57	0.39		0.25	0.17	0.1	19	0.36	0.67	0.92	0.9	8		(89)	
	Mean	interna	l tempera		r	r	<u> </u>			eps 3	to 7	in Table	e 9c)						
$fLA = Living area \div (4) = 0.47$ (91)	(90)m=	19.01	19.45	19.79	19.97	20.01	2	20.03	20.03	20.	03					93			
												fl	LA = Liv	ving area ÷ (4) =		0.47	(91)	

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m=	19.59	19.97	20.27	20.44	20.47	20.48	20.49	20.49	20.48	20.4	19.99	19.51		(92)
Apply	adjustr	nent to t	he mear	n interna	l temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	19.59	19.97	20.27	20.44	20.47	20.48	20.49	20.49	20.48	20.4	19.99	19.51		(93)
8. Sp	ace hea	ting req	uirement	t										
Set T	i to the	mean int	ternal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	ilisation	factor for	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	n:	-	-						-		
(94)m=	0.97	0.9	0.77	0.58	0.41	0.27	0.19	0.22	0.38	0.69	0.92	0.97		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8-	4)m							-		
(95)m=	1372.94	1703.74	1815.98	1633.09	1267.87	842.61	556.64	583.76	915.81	1336.15	1376.23	1273.37		(95)
Month	nly aver	age exte	ernal tem	perature	e from Ta	able 8						-		
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	2270.39	2231.63	2034.43	1680.81	1274.71	843.2	556.7	583.89	919.26	1424.04	1883.14	2249.1		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Nh/mon	h = 0.02	4 x [(97))m – (95)m] x (4 ⁻	1)m			
(98)m=	667.7	354.75	162.53	34.36	5.09	0	0	0	0	65.39	364.98	725.94		
								Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	2380.73	(98)
Snac	a haatin		omont in	kWh/m²	2/voar								17.69	(99)
		-			/year								17.69	(33)
8c. S _l	bace co	oling red	quiremer	nt					\					
Calcu	lated fo			August.										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	los <mark>s rate</mark>	e Lm (ca	llculated	using 2	5°C inter	nal temp						· · · ·		
											0	0		
(100)m=		0	0	0	0	1346.86	1060.29	1085.88	0	0	0	Ŭ		(100)
		0 tor for lo		0	0	1346.86	1060.29	1085.88	0	0	0			
	ation fac			0	0	1346.86	1060.29	1085.88	0	0	0	0		(100)
Utilisa (101)m=	ation fac	tor for lo	oss hm		0	1	1	1						
Utilisa (101)m= Usefu (102)m=	ation fac 0 Il loss, h 0	omLm (V	0 0 Vatts) = 0 0	0 (100)m × 0	0 (101)m 0	1 1341.86	1 1058.76	1 1083.13	0					
Utilisa (101)m= Usefu (102)m=	ation fac 0 Il loss, h 0	omLm (V	0 0 Vatts) = 0 0	0 (100)m x	0 (101)m 0	1 1341.86	1 1058.76	1 1083.13	0	0	0	0		(101)
Utilisa (101)m= Usefu (102)m=	ation fac 0 Il loss, h 0 s (solar s	omLm (V	0 0 Vatts) = 0 0	0 (100)m × 0	0 (101)m 0	1 1341.86	1 1058.76 egion, se	1 1083.13 e Table	0	0	0	0		(101)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i>	ation fac 0 Il loss, h 0 s (solar 0 e coolin	tor for lo 0 mLm (V 0 gains ca 0 g require	Vatts) = 0 0 lculated 0 ement fo	0 (100)m × 0 for appli 0 <i>r month,</i>	0 (101)m 0 cable we 0 whole c	1 1341.86 eather re 3504.12	1 1058.76 2gion, se 3355.83	1 1083.13 e Table 3051.32	0 0 10) 0	0	0	0	x (41)m	(101) (102)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1	ation fac 0 Il loss, f 0 s (solar g 0 e coolin 04)m to	tor for lo mLm (V 0 gains ca 0 g require 2 zero if (Vatts) = 0 Vatts) = 0 Iculated 0 <i>cment fo</i> (104)m <	0 (100)m × 0 for appli 0 r month, < 3 × (98	0 (101)m 0 cable we 0 whole c)m	1 1341.86 eather re 3504.12 dwelling,	1 1058.76 2gion, se 3355.83 <i>continue</i>	1 1083.13 e Table 3051.32 cus (kW	0 10) 0 /h) = 0.0	0 0 24 x [(10	0 0 0 03) <i>m</i> – (0 0 0 102)m]:	x (41)m	(101) (102)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i>	ation fac 0 Il loss, f 0 s (solar g 0 e coolin 04)m to	tor for lo 0 mLm (V 0 gains ca 0 g require	Vatts) = 0 0 lculated 0 ement fo	0 (100)m × 0 for appli 0 <i>r month,</i>	0 (101)m 0 cable we 0 whole c	1 1341.86 eather re 3504.12 dwelling,	1 1058.76 2gion, se 3355.83	1 1083.13 e Table 3051.32 cus (kW	0 10) 0 <i>(h)</i> = 0.0	0 0 24 x [(10	0 0 03)m - (0	0	x (41)m	(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1 (104)m=	ation fac 0 11 loss, h 0 5 (solar) 0 6 <i>coolin</i> 04)m to 0	tor for lo 0 mLm (V 0 gains ca 0 g require 2 zero if (0	Vatts) = 0 Vatts) = 0 Iculated 0 <i>cment fo</i> (104)m <	0 (100)m × 0 for appli 0 r month, < 3 × (98	0 (101)m 0 cable we 0 whole c)m	1 1341.86 eather re 3504.12 dwelling,	1 1058.76 2gion, se 3355.83 <i>continue</i>	1 1083.13 e Table 3051.32 cus (kW	0 10) 0 /h) = 0.0	0 0 24 x [(10 0 = Sum(0 0 03) <i>m</i> – (0 1,04)	0 0 102)m]: 0 =	4730.18	(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1 (104)m= Coolec	ation fac 0 Il loss, h 0 (solar 0 e coolin 04)m to 0	gains ca grequire zero if (Vatts) = 0 0 lculated 0 ement fo (104)m <	0 (100)m × 0 for appli 0 or month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m	1 1341.86 eather re 3504.12 dwelling,	1 1058.76 2gion, se 3355.83 <i>continue</i>	1 1083.13 e Table 3051.32 cus (kW	0 10) 0 /h) = 0.0	0 0 24 x [(10 0 = Sum(0 0 03)m - (0	0 0 102)m]: 0 =		(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spact</i> set (1 (104)m= Coolect	ation fac 0 11 loss, r 0 6 (solar g 0 e coolin 04)m to 0 1 fraction ittency f	tor for lo mLm (V 0 gains ca 0 g require 2 zero if (0 n actor (Ta	0 0 0 0 1culated 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 (100)m × 0 for appli 0 <i>r month,</i> 3 × (98 0	0 (101)m 0 cable we 0 <i>whole c</i>)m 0	1 1341.86 eather re 3504.12 welling, 1556.83	1 1058.76 2gion, se 3355.83 <i>continuo</i> 1709.02	1 1083.13 e Table 3051.32 Dus (kW 1464.33	0 10) 0 /h) = 0.0. 0 Total f C =	0 0 24 x [(10 0 = Sum(cooled a	0 0 03) <i>m - (</i> 0 1,04) area ÷ (4	0 0 102)m]: 0 = 1) =	4730.18	(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1 (104)m= Coolec	ation fac 0 11 loss, r 0 6 (solar g 0 e coolin 04)m to 0 1 fraction ittency f	gains ca grequire zero if (Vatts) = 0 0 lculated 0 ement fo (104)m <	0 (100)m × 0 for appli 0 or month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m	1 1341.86 eather re 3504.12 dwelling,	1 1058.76 2gion, se 3355.83 <i>continue</i>	1 1083.13 e Table 3051.32 cus (kW	0 10) 0 (h) = 0.0 Total f C = 0	0 0 24 x [(10 0 = Sum(cooled a	0 0 03) <i>m</i> - (0 1,04) area ÷ (4	0 0 102)m]: 0 =	4730.18	(101) (102) (103) (104) (105)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolect Intermi (106)m=	ation fac 0 1 loss, h 0 (solar) 6 (solar) 6 (solar) 0 e coolin 04)m to 0 1 fraction ttency f 0	tor for lo omLm (V o gains ca o g require o zero if (o actor (Ta o	0 0 Vatts) = 0 0 1culated 0 cment for (104)m 0 able 10b 0	0 (100)m × o for appli 0 <i>r month,</i> 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0	1 1341.86 eather re 3504.12 <i>welling,</i> 1556.83	1 1058.76 2gion, se 3355.83 <i>continua</i> 1709.02	1 1083.13 e Table 3051.32 ous (kW 1464.33	0 10) 0 (h) = 0.0 Total f C = 0	0 0 24 x [(10 0 = Sum(cooled a	0 0 03) <i>m</i> - (0 1,04) area ÷ (4	0 0 102)m]: 0 = 1) =	4730.18	(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec Intermit (106)m=	ation fac 0 1 loss, r 0 s (solar) cooling cooling	tor for lo tor for lo 0 mLm (V 0 gains ca 0 g require 2 zero if (0 n actor (Ta 0 require	vatts) = 0 0 lculated 0 ement fo (104)m < 0 able 10b 0 ment for	0 (100)m × 0 for appli 0 or month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0	1341.86 eather re 3504.12 dwelling, 1556.83 0.25 × (105)	1 2gion, se 3355.83 <i>continue</i> 1709.02 0.25 × (106)r	1 1083.13 e Table 3051.32 ous (kW 1464.33 0.25	0 10) 0 (h) = 0.0 Total f C = 0 Total	0 0 24 x [(10 0 = Sum(cooled a 0 7 = Sum(0 0 03) <i>m</i> – (0 1,04) area ÷ (4 0 1,04)	0 0 102)m]: 0 = 4) = 0 =	4730.18	(101) (102) (103) (104) (105)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolect Intermi (106)m=	ation fac 0 1 loss, r 0 s (solar) cooling cooling	tor for lo omLm (V o gains ca o g require o zero if (o actor (Ta o	0 0 Vatts) = 0 0 1culated 0 cment for (104)m 0 able 10b 0	0 (100)m × o for appli 0 <i>r month,</i> 3 × (98 0	0 (101)m 0 cable we 0 <i>whole</i> c)m 0	1 1341.86 eather re 3504.12 <i>welling,</i> 1556.83	1 1058.76 2gion, se 3355.83 <i>continua</i> 1709.02	1 1083.13 e Table 3051.32 ous (kW 1464.33	0 10) 0 <i>(h)</i> = 0.0, 0 Total f C = 0 Total 0 Total	0 0 24 x [(10 0 = Sum(cooled a 0 1 = Sum(0	0 0 03)m - (104) area ÷ (4 0 104) 0	$ \begin{array}{c} 0 \\ 0 \\ 102)m] \\ 0 \\ = \\ 1) = \\ 0 \\ = \\ 0 \\ 0 \end{array} $	4730.18 0.91 0	(101) (102) (103) (104) (105) (106)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec Intermit (106)m=	ation fac 0 1 loss, r 0 s (solar) cooling cooling	tor for lo tor for lo 0 mLm (V 0 gains ca 0 g require 2 zero if (0 n actor (Ta 0 require	vatts) = 0 0 lculated 0 ement fo (104)m < 0 able 10b 0 ment for	0 (100)m × 0 for appli 0 or month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0	1341.86 eather re 3504.12 dwelling, 1556.83 0.25 × (105)	1 2gion, se 3355.83 <i>continue</i> 1709.02 0.25 × (106)r	1 1083.13 e Table 3051.32 ous (kW 1464.33 0.25	0 10) 0 <i>(h)</i> = 0.0, 0 Total f C = 0 Total 0 Total	0 0 24 x [(10 0 = Sum(cooled a 0 7 = Sum(0 0 03)m - (104) area ÷ (4 0 104) 0	0 0 102)m]: 0 = 4) = 0 =	4730.18	(101) (102) (103) (104) (105)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	ation fac 0 1 loss, h 0 (solar) cooling 0 cooling 0	tor for lo omLm (V 0 gains ca 0 g require 0 zero if (0 actor (Ta 0 requirer 0	vatts) = 0 Vatts) = 0 lculated 0 cment for 0 able 10b 0 ment for 0	0 (100)m × 0 for appli 0 or month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0 0	1341.86 eather re 3504.12 dwelling, 1556.83 0.25 × (105)	1 2gion, se 3355.83 <i>continue</i> 1709.02 0.25 × (106)r	1 1083.13 e Table 3051.32 ous (kW 1464.33 0.25	0 10) 0 (h) = 0.0 0 Total f C = 0 Total 0 Total	0 0 24 x [(10 0 = Sum(cooled a 0 1 = Sum(0	0 0 03)m - (104) area ÷ (4 0 104) 0	$ \begin{array}{c} 0 \\ 0 \\ 102)m] \\ 0 \\ = \\ 1) = \\ 0 \\ = \\ 0 \\ 0 \end{array} $	4730.18 0.91 0	(101) (102) (103) (104) (105) (106)
Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	ation fac 0 1 loss, r 0 s (solar) cooling 0 cooling 0 cooling	tor for lo omLm (V 0 gains ca 0 g require 2 zero if (0 n actor (Ta 0 requirer 0	vatts) = 0 Vatts) = 0 lculated lculated 0 lculated 10 l	0 (100)m × o for appli 0 <i>or month,</i> 3 × (98 0 0	0 (101)m 0 cable we 0 whole c)m 0 0 : (104)m 0 ; (104)m 0	1341.86 eather re 3504.12 dwelling, 1556.83 0.25 × (105) 352.77	1 1058.76 2gion, se 3355.83 <i>continue</i> 1709.02 0.25 × (106)r 387.26	1 1083.13 e Table 3051.32 ous (kW 1464.33 0.25	0 10) 0 (h) = 0.0 0 Total f C = 0 Total 0 Total	0 0 24 x [(10 0 = Sum(cooled a 0 ' = Sum(0 = Sum(0 0 03)m - (104) area ÷ (4 0 104) 0	$ \begin{array}{c} 0 \\ 0 \\ 102)m] \\ 0 \\ = \\ 1) = \\ 0 \\ = \\ 0 \\ 0 \end{array} $	4730.18 0.91 0 1071.85	(101) (102) (103) (104) (105) (106) (107)
Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermi (106)m= Space (107)m= Space 9b. En	ation fac 0 1 loss, h 0 (solar f 0 e coolin 0 1 fraction 1 fraction 1 fraction 1 fraction 0 1 fraction 0 1 fraction 0 1 fraction 0 1 fraction 1 fraction 0 1 fraction 1 fraction 0 1 fraction 1 frac	tor for lo nmLm (V 0 gains ca 0 g require 2 zero if (0 cero if (0 n actor (Ta 0 requirer 0 requirer	vatts) = 0 Vatts) = 0 Iculated Iculated Icul	0 (100)m × 0 for appli 0 or month, 3 × (98 0) 0) 0 wonth = 0	0 (101)m 0 cable we 0 whole c)m 0 (104)m 0 (104)m 0 vear heating	1 1341.86 eather re 3504.12 <i>welling,</i> 1556.83 0.25 × (105) 352.77 scheme	1 1058.76 2gion, se 3355.83 continua 1709.02 0.25 × (106)r 387.26	1 1083.13 e Table 3051.32 <i>Dus (kW</i> 1464.33 0.25 n 331.81	0 10) 0 /h) = 0.0. 0 Total f C = 0 Total 0 Total (107)	$ \begin{array}{c} 0 \\ 0 \\ 24 \times [(10) \\ 0 \\ = Sum(\\ cooled \\ 0 \\ = Sum(\\ 0 \\ 0 \\ = Sum(\\ 0 \\ 0 \\ = Sum(\\ 0 \\ 0 \\ = Sum(\\ 0 \\ 0 \\ 0 \\ = Sum(\\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	0 0 03) <i>m</i> – (1 0 1,04) area ÷ (4 0 1,04) 0 1,07)	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 102)m]: \\ 0 \\ = \\ 4) = \\ 0 \\ = \\ 0 \\ = \\ 0 $	4730.18 0.91 0 1071.85	(101) (102) (103) (104) (105) (106) (107)

Fraction of space heat from community syste	em 1 – (301) =		1	(302)
The community scheme may obtain heat from several s includes boilers, heat pumps, geothermal and waste he Fraction of heat from Community boilers		,	the latter	(303a)
Fraction of total space heat from Community	boilers	(302) x (303a) =	1	(304a)
Factor for control and charging method (Tabl			1	(305)
Distribution loss factor (Table 12c) for comm			1.05	(306)
Space heating			kWh/year	
Annual space heating requirement			2380.73	7
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	2499.77	(307a)
Efficiency of secondary/supplementary heating	ng system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/s	supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2388.47	-
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2507.9	(310a)
Electricity used for heat distribution	0.	01 × [(307a)(307e) + (310a)(310e)] =	50.08	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Spa <mark>ce co</mark> oling (if there is a fixed cooling syst	em, if not enter 0)	= (107) ÷ (314) =	224.92	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or		e	432.44	(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) =	432.44	(331)
Energy for lighting (calculated in Appendix L))		477.34	(332)
10b. Fuel costs – Community heating scher	ne			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.01 =	105.99	(340a)
Water heating from CHP	(310a) x	4.24 × 0.01 =	106.33	(342a)
		Fuel Price		-
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	29.67	(348)
Pumps and fans	(331)	13.19 × 0.01 =	57.04	(349)
Energy for lighting	(332)	13.19 × 0.01 =	62.96	(350)
Additional standing charges (Table 12)			120	(351)
Total energy cost = (34	40a)(342e) + (345)(354) =		481.99	(355)

Total energy cost

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF) [(355) x (356)] ÷ [(4) -	+ 45.0] =			1.13	(357)
SAP rating (section12)				84.28	(358)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission fa kg CO2/kWł		nissions CO2/year	
CO2 from other sources of space and water heating (not 0 Efficiency of heat source 1 (%) If there is CH	CHP) IP using two fuels repeat (363) to	(366) for the seco	nd fuel	91	(367a)
CO2 associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x	0] = [1188.63	(367)
Electrical energy for heat distribution	[(313) x	0.52] = [25.99	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372	2)	=	1214.62	(373)
CO2 associated with space heating (secondary)	(309) x	0] = [0	(374)
CO2 associated with water from immersion heater or insta	antaneous heater (312) x	0.22] = [0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		- [1214.62	(376)
CO2 associated with space cooling	(315) x	0.52] = [116.73	(377)
CO2 associated with electricity for pumps and fans within	dwelling (331)) x	0.52] = [224.43	(378)
CO2 associated with electricity for lighting	(332))) x	0.52] = [247.74	(379)
Total CO2, kg/year sum of (376)(382) =				1803.53	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =				13.4	(384)
El rating (section 14)				86.54	(385)
13b. Primary Energy – Community heating scheme					
	Energy kWh/year	Primary factor		Ene <mark>rgy</mark> /h/year	
Energy from other sources of space and water heating (no Efficiency of heat source 1 (%) If there is Ch	ot CHP) IP using two fuels repeat (363) to	(366) for the seco	nd fuel	91	(367a)
Energy associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x	0] = [6713.57	(367)
Electrical energy for heat distribution	[(313) x] = [153.74	(372)
Total Energy associated with community systems	(363)(366) + (368)(372	2)	= [6867.31	(373)
if it is negative set (373) to zero (unless specified otherv	vise, see C7 in Appendix C	;)	[6867.31	(373)
Energy associated with space heating (secondary)	(309) x	0] = [0	(374)
Energy associated with water from immersion heater or in	stantaneous heater(312) x	1.22] = [0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =		[6867.31	(376)
Energy associated with space cooling	(315) x	3.07] = [690.5	(377)
Energy associated with electricity for pumps and fans with	in dwelling (331)) x	3.07] = [1327.58	(378)
Energy associated with electricity for lighting	(332))) x	3.07] = [1465.44	(379)
Total Primary Energy, kWh/year sum of	(376)(382) =			10350.82	(383)

			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201	_	:	Stroma Softwa	re Ver			Versio	on: 1.0.4.7	
		Pro	operty A	Address:	5F					
Address :										
1. Overall dwelling dime	nsions:		•	(2)		A 11	·) (- l (2)	
Ground floor			Area	· ·	(1a) x	Av. Hei		(2a) =	Volume(m ³)	(3a)
Total floor area TFA = (1)	2)+(1b)+(1c)+(1d)+(1c	ມ)⊥ (1n)			(14)	2.	.85	(2a) =	275.88	_(3a)
Dwelling volume	a)+(10)+(10)+(10)+(10)	;)+(III)	9	6.8		+(3c)+(3d)+(3e)+	.(3n) =	275.88	(5)
-					() ()		, (,		275.88	(3)
2. Ventilation rate:	main se	econdary		other		total			m ³ per hou	r
		eating		ouner		total				
Number of chimneys	0 +	0	+	0		0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns					0	x 7	10 =	0	(7a)
Number of passive vents						0	х ′	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	ur
Infiltration due to chimne						0		÷ (5) =	0	(8)
If a pressurisation test has b		ed, proceed a	to (17), o	therwise c	ontinue fro	om (9) to (16)			
Number of storeys in the Additional infiltration	ie dweiling (ns)						[(9)	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0	.25 for steel or timber	frame or C).35 for	masonr	v constru	uction	[(0)	1100.1 -	0	(11)
if both types of wall are p	resent, use the value corres				•				Ŭ	
deducting areas of openir If suspended wooden f	• · ·	ed) or 0 1	(soalo	d) also	ontor ()					(12)
If no draught lobby, en			(Sealer	u), eise (0	(12)
Percentage of windows		ripped							0	(14)
Window infiltration		11	(0.25 - [0.2	x (14) ÷ 1	= [00		·	0	(15)
Infiltration rate			((8) + (10) -	+ (11) + (1	2) + (13) +	⊦ (15) =		0	(16)
Air permeability value,	q50, expressed in cub	oic metres	per ho	ur per so	quare me	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(1	7) ÷ 20]+(8),	, otherwis	se (18) = (*	16)				0.15	(18)
Air permeability value applie		s been done	or a deg	ree air per	meability i	is being us	sed			_
Number of sides sheltere Shelter factor	d			(20) = 1 - [0 075 x (1	9)1 –			2	(19)
Infiltration rate incorporat	ing shelter factor			(21) = (18)		0)] –			0.85	(20)
Infiltration rate modified for	-	1		(21) = (10)	x (20) -				0.13	(21)
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
			Jui	Aug	Oep	001	NOV	Dec		
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
			0.0	0.7	7	- T. U		".'	l	
Wind Factor $(22a)m = (22a)m $	· · · · ·								1	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	_			
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
	<i>ate effec</i> echanica		•	rate for t	he appli	cable ca	se						0.5	(220)
				endix N, (2	3b) = (23a	i) × Fmv (e	equation (N	N5)) . othei	rwise (23b) = (23a)			0.5	(23a) (23b)
				iency in %) (200)			0.5	
			-	-	-					$(h) m \pm ($	23b) v [·	1 – (23c)	77.35	(23c)
(24a)m=	i	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	- 100j	(24a)
				entilation								0.20		
(24b)m=				0	0				0	0	0	0		(24b)
		-	-	tilation c	_	-	-	•		ů	Ů	Ů	l	
,				hen (240	•	•				5 × (23t))			
(24c)m=	r í	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	n or wh	ole hous	e positiv	/e input v	ventilatio	n from l	oft				1	
,				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 (24b	o) or (24	c) or (24	d) in boy	(25)	-				
(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26		(25)
3. He	at losse	s and he	eat loss i	paramete	er:									
ELEN		Gros		Openin		Net Ar	ea	U-valu	Je	AXU		k-value	e /	A X k
		area	(m²)	m		A ,r	n²	W/m2	K	(W/	K)	kJ/m²·l	K I	kJ/K
Windo	ws Type	e 1				5.13	x1,	/[1/(1.4)+	0.04] =	6.8				(27)
Windo	ws Type	2				22.8	x1/	/[1/(1.4)+	0.04] =	30.23				(27)
Floo <mark>r</mark>						96.8	x	0.065	=	6.292				(28)
Walls ⁻	Type1	32.2	21	0		32.21	x	0.18	=	5.8	ו ר			(29)
Walls ⁻	Type2	11.6	69	0		11.69) x	0.18	 = [2.1	ז ד		$\exists \square$	(29)
Walls	ТуреЗ	24.2	23	22.8		1.43	x	1.4	i	2	i F		= _	(29)
Walls	Type4	10.5	55	0		10.55	; x	0.16		1.65	i F		≓	(29)
Walls -	Type5	15.3	39	15.39	9	0	×	1.4		0	= i		\dashv	(29)
	area of e					190.8	5		[-	L			(31)
				effective wi	ndow U-va		-	formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	()
				nternal wal			-			, <u>-</u>	-			
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				68.47	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	ign assess used instea			tails of the ulation.	construct	ion are not	t known pr	ecisely the	e indicative	values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						28.63	(36)
			are not kn	own (36) =	= 0.15 x (3	1)								
	abric he								(33) +	(36) =			97.1	(37)
Ventila	ation hea	at loss ca	alculated	l monthly						= 0.33 × ([25)m x (5] I	1	1	
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	25.11	24.82	24.53	23.08	22.79	21.34	21.34	21.05	21.92	22.79	23.37	23.95		(38)
Heat tr	ransfer c		nt, W/K		[]				(39)m	= (37) + (38)m		1	
(39)m=	122.21	121.92	121.63	120.18	119.89	118.44	118.44	118.15	119.02	119.89	120.47	121.05		
Stroma	FSAP 201	2 Version:	: 1.0.4.7 (S	SAP 9.92) -	http://ww	w.stroma.c	com		/	Average =	Sum(39)1	12 /12=	120. þí _{ag}	ge 2 o ⁽³⁹⁾

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.26	1.26	1.26	1.24	1.24	1.22	1.22	1.22	1.23	1.24	1.24	1.25		
· · · L			L	L					, ,	Average =	Sum(40)1.	12 /12=	1.24	(40)
Numbe			nth (Tab	<u>,</u>	Mov	lun	1.1	<u><u>Aug</u></u>	Son	Oct	Nov	Dec	l	
(41)m=	Jan ³¹	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	31	Nov 30	31		(41)
	51	20	51		51	- 50	51	51		51		51		()
4. Wat	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF/	A > 13.9	ipancy, 9, N = 1 9, N = 1		(1 - exp	(-0.0003	349 x (TF	-13.9)2)] + 0.(0013 x (⁻	TFA -13.		71		(42)
Reduce t	the annua	al average	hot water		5% if the c	welling is	designed	(25 x N) to achieve		se target o		.51		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г	-	-		ach month I	1			 I					I	
(44)m=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42 m(44) ₁₁₂ =	108.36	1182.14	(44)
Energy c	ontent of	hot water	used - cal	lculated m	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600					1162.14	(44)
(45)m=	160.7	140.55	145.03	126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		
lf instanta	aneous w	ater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1549.97	(45)
(46)m=	24.1	21.08	21.76	18. <mark>97</mark>	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
Water a	-		includir	na anv se	olar or W	/WHRS	storage	within sa	ame ves	sel	· · · ·	200		(47)
-				ank in dw							· · · · ·	200		()
Otherw	ise if no	stored			-			ombi boil	ers) ente	er '0' in (47)			
Water s	-		aclarad I	oss facto	or is kno	wn (k\//	n/dav).					24		(49)
			m Table				vuay).					24 .6		(48) (49)
•				e, kWh/ye	ear			(48) x (49)) =			34		(50)
b) If ma	anufact	urer's de	eclared	cylinder	loss fact		known:					•		()
		-	factor fi	rom Tabl	le 2 (kW	h/litre/da	ay)					0		(51)
		from Ta		011 4.5								0		(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)
Energy	lost fro	m water	. storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter ((50) or ((54) in (5	55)								1.	34		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
If cylinde	r contains	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
		•	,	om Table								0		(58)
							• •	65 x (41)		u 41a - u	ata 1)			
·			r	ı —	· · · · · ·	· · · · · ·	i	ng and a		i	, 	22.26	l	(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		(53)

Combi	loss ca	alculated	for eac	ch	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 rec	uired for	water	he	ating ca	alculated	for e	each mor	nth	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	225.63	199.19	209.9	6	189.28	186.25	167.	53 161.9	94	176.25	175.49	196.22	206.14	220.55		(62)
Solar DH	IW input	calculated	using A	ppe	ndix G or	Appendix	H (ne	gative qua	Intity	r) (enter '0	' if no sola	r contribu	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	Sa	and/or V	VWHRS	appl	ies, see	Арр	pendix (<u>3)</u>		_			
(63)m=	0	0	0		0	0	0	0		0	0	0	0	0		(63)
Output	from v	vater hea	ter													
(64)m=	225.63	199.19	209.9	6	189.28	186.25	167.	53 161.9	94	176.25	175.49	196.22	206.14	220.55		-
										Outp	out from wa	ater heate	er (annual)₁	12	2314.43	(64)
Heat g	ains fro	om water	heatin	g,	kWh/m	onth 0.2	5 ´ [0	.85 × (45	5)m	+ (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	105.37	93.65	100.1	6	92.31	92.28	85.0	84.2	2	88.96	87.72	95.59	97.92	103.69		(65)
inclu	de (57))m in calo	culation	n o	f (65)m	only if c	ylind	er is in th	ne d	dwelling	or hot w	ater is f	rom com	munity ł	neating	
5. Int	ernal g	ains (see	e Table	5	and 5a)):										
Metab	olic gai	ns (Table	e 5), W	att	S						-	-		-		
	Jan	Feb	Ma	r	Apr	Мау	Ju	n Ju	I	Aug	Sep	Oct	Nov	Dec		
(66)m=	162.47	162.47	162.4	7	162.47	162.47	162.	47 162.4	47	162.47	162.47	162.47	162.47	162.47		(66)
Ligh <mark>tin</mark>	<mark>g g</mark> ains	(calcula	ted in <i>i</i>	Apj	pendix	_, equati	ion L	9 or L9a)), al	lso see	Table 5					
(67)m=	<mark>5</mark> 5.95	49.7	40.42		30.6	22.87	19.3	31 20.8	36	27.12	36.4	46.22	53.95	57.51		(67)
Applia	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uatio	n L13 or	L13	3a), also	see Ta	ble <mark>5</mark>				
(68)m=	3 <mark>74.7</mark>	378.59	368.7	Э	347.93	321.6	296.	85 280.:	32	276.43	286.23	307.09	333.42	358.17		(68)
Cookir	g gains	s (calcula	ited in	Ap	pendix	L, equat	ion L	15 or L1	5a)	, also se	e Table	5				
(69)m=	53.96	53.96	53.96		<u>53.</u> 96	53.96	53.9	6 53.9	6	53.96	53.96	53.96	53.96	53.96		(69)
Pumps	and fa	ins gains	(Table	e 5a	a)										·	
(70)m=	0	0	0		0	0	0	0		0	0	0	0	0		(70)
Losses	s e.g. e	vaporatio	n (neg	ati	ve valu	es) (Tab	le 5)					•	•	•		
(71)m=	-108.31	-108.31	-108.3	1	-108.31	-108.31	-108	31 -108.	.31	-108.31	-108.31	-108.31	-108.31	-108.31		(71)
Water	heating	, g gains (T	able 5	5)				•	•			•	•	•		
(72)m=	141.63	139.36	134.6	3	128.21	124.03	118.	16 113. ⁻	17	119.57	121.84	128.49	136	139.37		(72)
Total i	nterna	I gains =						(66)m + (6	67)m	+ (68)m -	+ (69)m + ((70)m + (7	, 71)m + (72)	m	4	
(73)m=	680.4	675.75	651.9	5	614.85	576.62	542.	44 522.4	47	531.23	552.58	589.91	631.47	663.15]	(73)
6. So	lar gain	IS:														
Solar g	ains are	calculated	using so	olar	flux from	Table 6a a	and as	sociated e	quat	tions to co	onvert to th	e applica	ble orientat	ion.		
Orienta		Access F			Area			Flux		_	g_		FF		Gains	
		Table 6d			m²			Table 6a	a	1	able 6b	T	able 6c		(W)	_
East	0.9x	3		x	5.1	3	x	19.64		x	0.63	x	1	=	131.97	(76)
East	0.9x	3		x	5.1	3	x	38.42		x	0.63	x	1	=	258.15	(76)
East	0.9x	3		x	5.1	3	x	63.27		x	0.63	×	1	=	425.14	(76)
East	0.9x	3		x	5.1	3	x	92.28		x	0.63	×	1	=	620.04	(76)
East	0.9x	3		x	5.1	3	x	113.09		x	0.63	×	1	=	759.88	(76)

East													
Lasi	0.9x	3	x	5.13	x	115.77	x	0.63	×	1	=	777.88	(76)
East	0.9x	3	x	5.13	x	110.22	x	0.63	x	1	=	740.57	(76)
East	0.9x	3	x	5.13	x	94.68	x	0.63	x	1	=	636.14	(76)
East	0.9x	3	x	5.13	x	73.59	×	0.63	x	1	=	494.46	(76)
East	0.9x	3	x	5.13	×	45.59	×	0.63	x	1	=	306.32	(76)
East	0.9x	3	x	5.13	×	24.49	×	0.63	x	1	=	164.55	(76)
East	0.9x	3	x	5.13	×	16.15	×	0.63	x	1	=	108.52	(76)
South	0.9x	0.77	x	22.8	×	46.75	×	0.63	×	1	=	465.38	(78)
South	0.9x	0.77	x	22.8	×	76.57	×	0.63	x	1	=	762.18	(78)
South	0.9x	0.77	x	22.8	×	97.53	×	0.63	x	1	=	970.88	(78)
South	0.9x	0.77	x	22.8	×	110.23	×	0.63	×	1	=	1097.3	(78)
South	0.9x	0.77	x	22.8	×	114.87	×	0.63	×	1	=	1143.46	(78)
South	0.9x	0.77	x	22.8	×	110.55	_ × [0.63	x	1	=	1100.42	(78)
South	0.9x	0.77	x	22.8	×	108.01	_ × [0.63	x	1	=	1075.18	(78)
South	0.9x	0.77	x	22.8	×	104.89	_ × [0.63	x	1	=	1044.15	(78)
South	0.9x	0.77	x	22.8	×	101.89	_ × [0.63	x	1	=	1014.2	(78)
South	0.9x	0.77	x	22.8	×	82.59	×	0.63	x	1	=	822.08	(78)
South	0.9x	0.77	x	22.8		55.42	x	0.63	x	1	=	551.64	(78)
South	0.9x	0.77	×	22.8	X	40.4	7 x	0.63	x	1	=	402.13	(78)
Solar g	ains in	watts, calc	ulated	for each mo	onth		(83)m	= Sum(74)m .	<mark>(8</mark> 2)m				
(83)m=	<mark>59</mark> 7.35	1020.3 <mark>3</mark> 13	396.02	1717.34 190	3.34 1	878.3 1815.7	5 1680	.29 1508.65	1128.4	716.18	510.65		(83)
Tota <mark>l g</mark>	ains – i	nternal and	d solar	(84)m = (73)m + (83)m , watts							
(84)m=	1277.74	1696.08 20	047.96	2332.19 247									
					9.96 2	420.73 2338.2	1 2211	.51 2061.23	17 <mark>18.3</mark>	1 1347.65	1173.81		(84)
7. Me	an inter			heating sea		420.73 2338.2	1 2211	.51 2061.23	1718.3	1 1347.65	1173.81		(84)
		nal temper	rature (heating sea	son)	420.73 2338.2 area from Ta			1718.3	1 1347.65	1173.81	21	(84) (85)
Temp	erature	nal temper during hea	rature (ating pe	heating sea eriods in the	son) living		able 9,		1718.3	1 1347.65	1173.81	21	
Temp	erature	nal temper during hea	rature (ating pe	heating sea eriods in the ving area, h	son) living	area from Ta	able 9,	Th1 (°C)	17 <mark>18.3</mark> Oct		1173.81 Dec	21	
Temp	erature Ition fac	nal temper during hea tor for gair Feb	rature (ating pe	heating sea eriods in the ving area, h	son) living 1,m (s lay	area from Ta see Table 9a)	able 9,	Th1 (°C) Jg Sep				21	
Temp Utilisa (86)m=	erature Ition fac Jan 0.95	nal temper during hea tor for gair Feb 0.88	rature (ating pe ns for li Mar 0.76	heating sea eriods in the ving area, h Apr M 0.6 0.4	son) living 1,m (s lay	area from Ta see Table 9a) Jun Jul	able 9, Au	Th1 (°C) Jg Sep 5 0.4	Oct	Nov	Dec	21	(85)
Temp Utilisa (86)m=	erature Ition fac Jan 0.95	nal temper during hea tor for gair Feb 0.88 I temperatu	rature (ating pe ns for li Mar 0.76	heating sea eriods in the ving area, h Apr M 0.6 0.4	son) living 1,m (s lay 14 1 (follo	area from Ta see Table 9a) Jun Jul 0.31 0.22	able 9, Au	Th1 (°C) ug Sep 5 0.4 able 9c)	Oct	Nov 0.9	Dec	21	(85)
Temp Utilisa (86)m= Mean (87)m=	erature tion fac Jan 0.95 interna 20.22	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55	rature (ating pe ns for li Mar 0.76 ure in li 20.8	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20.4	son) living 1,m (s lay ¹⁴ 1 (follo	area from Ta see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to 21 21	able 9, Au 0.2 7 in T 21	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99	Oct 0.67	Nov 0.9	Dec 0.97	21	(85)
Temp Utilisa (86)m= Mean (87)m=	erature tion fac Jan 0.95 interna 20.22	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea	rature (ating pe ns for li Mar 0.76 ure in li 20.8	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20.4	son) living 1,m (s lay 14 1 (follo 99	area from Ta see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to	able 9, Au 0.2 7 in T 21	Th1 (°C) Jg Sep 5 0.4 able 9c) 20.99 1, Th2 (°C)	Oct 0.67	Nov 0.9 20.56	Dec 0.97	21	(85)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	erature tion fac Jan 0.95 interna 20.22 erature 19.87	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87	rature (ating pe ns for li Mar 0.76 ure in li 20.8 ating pe	heating seapriods in theving area, hAprN0.60.4iving areaT20.9420.priods in res19.8919.8919.	son) living 1,m (s lay 14 1 (follo 99 t of dv 89	area from Tasee Table 9a)JunJunJun0.310.22ow steps 3 to212121219.919.9	able 9, 0.2 7 in T 21 Table 9	Th1 (°C) Jg Sep 5 0.4 able 9c) 20.99 1, Th2 (°C)	Oct 0.67 20.92	Nov 0.9 20.56	Dec 0.97 20.14	21	(85) (86) (87)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa	erature ation fac Jan 0.95 interna 20.22 erature 19.87 ation fac	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87	rature (ating pe ns for li Mar 0.76 ure in li 20.8 ating pe 19.88	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20. eriods in res 19.89 19.	son) living 1,m (s lay 14 1 (follo 99 t of dv 89 ng, h2	area from Ta see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Tabl	able 9, Au 0.2 7 in T 21 Cable 9 19. e 9a)	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 0, Th2 (°C) 9 19.9	Oct 0.67 20.92 19.89	Nov 0.9 20.56 19.88	Dec 0.97 20.14 19.88	21	(85) (86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 0.95 interna 20.22 erature 19.87 ation fac 0.94	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87	rature (ating pe ns for li Mar 0.76 ure in li 20.8 19.88 19.88 19.88	heating seaeriods in theving area, hAprN0.60.4iving areaT20.9420.eriods in res19.8919.est of dwelli0.550.3	son) living 1,m (s lay 14 1 (follo 99 t of dv 89 ng, h2 39	area from Tage see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Tabl 0.26 0.17	able 9, Au 0.2 7 in T 21 7 in S 19. e 9a) 0.1	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 0, Th2 (°C) 9 19.9 9 0.33	Oct 0.67 20.92 19.89 0.62	Nov 0.9 20.56	Dec 0.97 20.14	21	(85) (86) (87)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	erature ation fac Jan 0.95 interna 20.22 erature 19.87 ation fac 0.94 interna	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87 tor for gair 0.85	rature (ating pe ns for li Mar 0.76 ure in li 20.8 ating pe 19.88 ns for re 0.72 ure in t	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20. eriods in res 19.89 19.89 19. est of dwelli 0.55 0.55 0.3 he rest of dwelli 0.55	son) living 1,m (s lay 14 1 (follo 99 t of dv 89 ng, h2 39 velling	area from Tage see Table 9a) Jun Jul 0.31 0.22 pw steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Table 0.26 0.17 T2 (follow signal	able 9, Au 0.2 7 in T 21 Table 9 19. e 9a) 0.1 teps 3	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 1, Th2 (°C) 9 19.9 9 0.33 to 7 in Tabl	Oct 0.67 20.92 19.89 0.62 e 9c)	Nov 0.9 20.56 19.88 0.88	Dec 0.97 20.14 19.88 0.96	21	(85) (86) (87) (88) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 0.95 interna 20.22 erature 19.87 ation fac 0.94	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87 tor for gair 0.85	rature (ating pe ns for li Mar 0.76 ure in li 20.8 19.88 19.88 19.88	heating seaeriods in theving area, hAprN0.60.4iving areaT20.9420.eriods in res19.8919.est of dwelli0.550.3	son) living 1,m (s lay 14 1 (follo 99 t of dv 89 ng, h2 39 velling	area from Tage see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Tabl 0.26 0.17	able 9, Au 0.2 7 in T 21 7 in S 19. e 9a) 0.1	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 0, Th2 (°C) 9 19.9 9 0.33 to 7 in Tabl 9 19.89	Oct 0.67 20.92 19.89 0.62 e 9c) 19.81	Nov 0.9 20.56 19.88 0.88	Dec 0.97 20.14 19.88 0.96 18.8		(85) (86) (87) (88) (89) (90)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	erature tion fac Jan 0.95 interna 20.22 erature 19.87 tion fac 0.94 interna 18.9	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87 tor for gair 0.85 I temperatu 19.34	rature (ating pe ns for li Mar 0.76 ure in li 20.8 19.88 19.88 ns for re 0.72 ure in t 19.66	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20. eriods in res 19.89 19. est of dwelli 0.55 0.3 he rest of dw 19.83 19.	son) living 1,m (s lay 14 1 (follo 99 t of dv 89 ng, h2 39 velling 88	area from Tage see Table 9a) Jun Jul 0.31 0.22 ow steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Tabl 0.26 0.17 T2 (follow st 19.9 19.9	able 9, Au 0.2 7 in T 21 7 in T 21 19. e 9a) 0.1 teps 3 19.	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 0, Th2 (°C) 9 19.9 9 0.33 to 7 in Tabl 9 19.89 f	Oct 0.67 20.92 19.89 0.62 e 9c) 19.81	Nov 0.9 20.56 19.88 0.88	Dec 0.97 20.14 19.88 0.96 18.8	0.41	(85) (86) (87) (88) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	erature tion fac Jan 0.95 interna 20.22 erature 19.87 tion fac 0.94 interna 18.9	nal temper during hea tor for gair Feb 0.88 I temperatu 20.55 during hea 19.87 tor for gair 0.85 I temperatu 19.34	rature (ating pe ns for li Mar 0.76 ure in li 20.8 19.88 19.88 ns for re 0.72 ure in t 19.66	heating sea eriods in the ving area, h Apr N 0.6 0.4 iving area T 20.94 20. eriods in res 19.89 19. est of dwelli 0.55 0.3 he rest of dw 19.83 19.	son) living 1,m (s lay 1 1 (follo 99 t of dv 89 mg, h2 39 welling 88	area from Tage see Table 9a) Jun Jul 0.31 0.22 pw steps 3 to 21 21 velling from T 19.9 19.9 ,m (see Table 0.26 0.17 T2 (follow signal	able 9, Au 0.2 7 in T 21 7 in T 21 19. e 9a) 0.1 teps 3 19.	Th1 (°C) ug Sep 5 0.4 able 9c) 20.99 0, Th2 (°C) 9 19.9 9 0.33 to 7 in Tabl 9 19.89 f - fLA) × T2	Oct 0.67 20.92 19.89 0.62 e 9c) 19.81	Nov 0.9 20.56 19.88 0.88 19.38 ing area ÷ (-	Dec 0.97 20.14 19.88 0.96 18.8		(85) (86) (87) (88) (89) (90)

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

(93)m= 19.44 19.44 20.13 20.29 20.33 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.35 20.37 20.35 20.37 20.35 20.37 20.35 20.37 20.35 20.35 20.37 20.35 20.37 <t< th=""></t<>						
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:: (9)me 0.94 0.85 0.73 0.57 0.41 0.28 0.19 0.21 0.36 0.64 0.87 0.95 (94) Useful gains, hmGm, W = (94)m (94)m 0.41 0.26 0.19 0.21 0.36 0.64 0.87 0.95 (94) Useful gains, hmGm, W = (94)m (94)m (94)m (94)m (94)m (95)m (197.7 144.81 1489.73 1320.74 1025.49 680.06 444.34 466.95 739.65 1093.68 1197.07 1117.58 (95) Monthly average external temperature from Table 8 (90)m (97)m 1850.43 1821.44 165.73 1368.43 1035.16 681.2 444.47 67.17 743.35 1185.83 153.79 183.414 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)						
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Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94) 0.94 0.85 0.73 0.57 0.41 0.28 0.19 0.21 0.36 0.64 0.87 0.95 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m 1197.7 144.481 1489.73 1320.74 1025.49 680.06 444.34 466.95 739.65 1093.68 1179.07 1117.58 (95) Monthly average external temperature from Table 8 (96)m 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, W =[(39)m x [(93)m - (96)m] (97)m (850.43 1821.46 1657.38 1368.43 1035.16 681.2 444.47 467.17 743.35 1183.41 (97) Space heating requirement for each month, kWh/month = 0.024 x [[(97)m - (95)m] x (41)m 98) 18.03 199)						
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Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m] (97)m= 1850.43 1821.46 1657.38 1368.43 1035.16 681.2 444.47 467.17 743.35 1158.83 1537.96 1834.14 (97) Space heating requirement for each month, kWh/month = $0.024 \times [(97)m - (95)m] \times (41)m$ (98)m= 485.63 253.11 124.73 34.34 7.2 0 0 0 48.48 258.4 533.12 Total per year (kWh/year) = Sum(98)						
(97)m= 1850.43 1821.46 1657.38 1368.43 1035.16 681.2 444.47 467.17 743.35 1158.83 1537.96 1834.14 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 485.63 253.11 124.73 34.34 7.2 0 0 0 48.48 258.4 533.12 Total per year (kWh/year) = Sum(98)sa.12 1745 (98) Space heating requirement in kWh/m²/year 18.03 (99) Sc. Space cooling requirement Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100) (100) (100) (101) (101) (101) (101) (101) (102) (102) (102) (102) (103) (102) (103) (102) (103) (103) (102) (103) (102) (103) (103) (103) (103)						
Space heating requirement for each month, kWh/month = $0.024 \times [(97)m - (95)m] \times (41)m$ (98)m= $485.63 \ 253.11 \ 124.73 \ 34.34 \ 7.2 \ 0 \ 0 \ 0 \ 48.48 \ 258.4 \ 533.12$ Total per year (kWh/year) = Sum(98)s. = 1745 (98) Space heating requirement in kWh/m ² /year 18.03 (99) 8c. Space cooling requirement in kWh/m ² /year 18.03 (99) 8c. Space cooling requirement in kWh/m ² /year 18.03 (99) 8c. Space cooling requirement in kWh/m ² /year 0 to 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
$Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (98) Space heating requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (98) Space heating requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (98) Space cooling requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (99) Sc. Space cooling requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (98) Space cooling requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (98) Space cooling requirement in kWh/m²/year $Total per year (kWh/year) = Sum(98)_{1.59.12} = 1745$ (99) Sc. Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m						
Space heating requirement in kWh/m²/year 8c. Space cooling requirement Calculated for June, July and August. See Table 10b Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
8c. Space cooling requirement Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 0 0 0 1113.31 876.43 897.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
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JanFebMarAprMayJunJulAugSepOctNovDecHeat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10)00001113.31876.43897.9200000(100)(100)m=00001113.31876.43897.920000(100)Utilisation factor for loss hm						
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)m= 0 0 0 1113.31 876.43 897.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
Utilisation factor for loss hm (101) m= 0 0 0 0.99 1 1 0 0 0 0 (101) Useful loss, hmLm (Watts) = (100) m x (101) m (102) m= 0 0 0 0 0 0 0 0 0 (101) Useful loss, hmLm (Watts) = (100) m x (101) m (102) m= 0 0 0 0 0 0 0 (102) Gains (solar gains calculated for applicable weather region, see Table 10) (103) m= 0 0 0 2737.85 2644.77 2495.2 0 0 0 (103) Space cooling requirement for month, whole dwelling, continuous (kWh) = $0.024 \times [(103)m - (102)m] \times (41)m$ (103)						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
Useful loss, hmLm (Watts) = (100) m x (101)m (102)m= 0 0 0 1104.34 873.46 893.62 0 0 0 0 (102) Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= 0 0 0 0 2737.85 2644.77 2495.2 0 0 0 0 (103) Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m (103)m - (102)m] x (41)m (103)m - (102)m] x (41)m						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
Gains (solar gains calculated for applicable weather region, see Table 10) $(103)m=$ 0002737.852644.772495.2000(103)Space cooling requirement for month, whole dwelling, continuous (kWh) = $0.024 \times [(103)m - (102)m] \times (41)m$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m – (102)m] x (41)m						
set (104)m to zero if (104)m < 3 × (98)m						
(104)m= 0 0 0 0 0 1176.13 1317.86 1191.58 0 0 0 0						
$Total = Sum(1_0A) = 3685.56$ (104)						
Cooled fraction $f C = cooled area \div (4) = 0.73$ (105)						
Intermittency factor (Table 10b)						
(106)m= 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0						
Total = Sum(1,0,4) = 0 (106)						
Space cooling requirement for month = (104)m × (105) × (106)m						
Space cooling requirement for month = $(104)m \times (105) \times (106)m$ (107)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <th <="" colspan="6" td=""></th>						
Space cooling requirement for month = $(104)m \times (105) \times (106)m$ (107)m = 0 0 0 0 0 215.97 241.99 218.8 0 0 0 0 0 Total = Sum(107) = 676.76 (107)						
Space cooling requirement for month = (104)m × (105) × (106)m (107)m= 0 0 0 215.97 241.99 218.8 0 0 0						
Space cooling requirement for month = $(104)m \times (105) \times (106)m$ (107)m = 0 0 0 0 0 215.97 241.99 218.8 0 0 0 0 0 Total = Sum(107) = 676.76 (107)						
Space cooling requirement for month = $(104)m \times (105) \times (106)m$ $(107)m = 0$ 0 0 0 105) $\times (106)m$ Total = Sum(107) = 676.76 (107) Space cooling requirement in kWh/m²/year (107) $\div (4) =$ (108)						

Fraction of space heat from community system 1 - (301) =

0	(301)
1	(302)

The community scheme may obtain heat from several sou includes boilers, heat pumps, geothermal and waste heat Fraction of heat from Community boilers			the latter	(303a)
Fraction of total space heat from Community b	oilers	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table		eating system	1	(305)
Distribution loss factor (Table 12c) for commun	nity heating system		1.05	(306)
Space heating			kWh/year	_
Annual space heating requirement			1745]
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	1832.25	(307a)
Efficiency of secondary/supplementary heating	g system in % (from Tab	ole 4a or Appendix E)	0	(308
Space heating requirement from secondary/su	pplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement If DHW from community scheme:			2314.43]
Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2430.15	(310a)
Electricity used for heat distribution	0.	01 × [(307a)(307e) + (310a)(310e)] =	42.62	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Space cooling (if there is a fixed cooling syster	m, if not enter 0)	= (107) ÷ (314) =	142.01	(315)
Electricity for pumps and fans within dwelling (
mechanical ventilation - balanced, extract or po	ositive input from outsic		235.6	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		= <mark>(330a)</mark> + (3 <mark>30b) + (</mark> 330g) =	235.6	(331)
Energy for lighting (calculated in Appendix L)			395.26	(332)
10b. Fuel costs – Community heating scheme	9			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.01 =	77.69	(340a)
Water heating from CHP	(310a) x	4.24 × 0.01 =	103.04	(342a)
	(0.15)	Fuel Price		-
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	18.73	(348)
Pumps and fans	(331)	13.19 × 0.01 =	31.08	(349)
Energy for lighting	(332)	13.19 × 0.01 =	52.13	(350)
Additional standing charges (Table 12)			120	(351)
Total energy cost = (340a	a)(342e) + (345)(354) =		402.67	(355)
11b. SAP rating - Community heating scheme	9			
Energy cost deflator (Table 12)			0.42	(356)

Energy cost factor (ECF) [(355) × (356)] ÷ [(4) +	45.0] =		1.19	(357)
SAP rating (section12)			83.36	(358)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/yea	r
CO2 from other sources of space and water heating (not C Efficiency of heat source 1 (%) If there is CHP	HP) P using two fuels repeat (363) to (366) for the second fue	el 91	(367a)
CO2 associated with heat source 1 [(3	07b)+(310b)] x 100 ÷ (367b) x	0	= 1011.73	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 22.12	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)) :	= 1033.86	(373)
CO2 associated with space heating (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from immersion heater or instan	ntaneous heater (312) x	0.22	= 0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		1033.86	(376)
CO2 associated with space cooling	(315) x	0.52	= 73.7	(377)
CO2 associated with electricity for pumps and fans within c	dwelling (331)) x	0.52	= 122.28	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 205.14	(379)
Total CO2, kg/year sum of (376)(382) =			1434.98	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			14.82	(384)
El rating (section 14)			86.44	(385)
13b. Primary Energy – Community heating scheme				
	Energy kWh/year	Primary factor	P.Ene <mark>rgy</mark> kWh/year	
Energy from other courses of an and under besting (as)		lactor	Kwii/yeai	
Energy from other sources of space and water heating (nor Efficiency of heat source 1 (%) If there is CHF	P using two fuels repeat (363) to (366) for the second fue	el 91	(367a)
Energy associated with heat source 1 [(3	07b)+(310b)] x 100 ÷ (367b) x	0	= 5714.43	(367)
Electrical energy for heat distribution	[(313) x		= 130.86	(372)
Total Energy associated with community systems	(363)(366) + (368)(372))	= 5845.28	(373)
if it is negative set (373) to zero (unless specified otherw	ise, see C7 in Appendix C))	5845.28	(373)
Energy associated with space heating (secondary)	(309) x	0	= 0	(374)
Energy associated with water from immersion heater or ins	tantaneous heater(312) x	1.22	= 0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =		5845.28	(376)
Energy associated with space cooling	(315) x	3.07	435.98	(377)
Energy associated with electricity for pumps and fans withi	n dwelling (331)) x	3.07	723.3	(378)
Energy associated with electricity for lighting	(332))) x	3.07	= 1213.44	(379)
Total Primary Energy, kWh/year sum of (376)(382) =		8218	(383)

		User I	Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Property	Address:	6F					
Address : 1. Overall dwelling dime	nsions:								
		Δre	a(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x	r	.85	(2a) =	214.03	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	75.1	(4)] [J
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	214.03	(5)
_							l		<u> </u>
2. Ventilation rate:	main se	econdary	other		total			m ³ per hour	
Number of chimneys		eating +	0] = [0	X	40 =	-	(6a)
Number of open flues			0	」 <u>「</u> 」 = 「	0		20 =	0	
Number of intermittent fa		0 +	0	」「└	0		10 =	0	(6b)
				Ļ	0			0	(7a)
Number of passive vents				L	0	x *	10 =	0	(7b)
Number of flueless gas f	ires				0	X 4	⁴⁰ =	o anges per hou	(7c) ur
Infiltration due to chimne					0		÷ (5) =	0	(8)
Number of storeys in t	peen carried out or is intende he dwelling (ns)	a, proceea to (17),	otherwise c	ontinue m	om (9) to (16)	[0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	rame or 0.35 fo	r masonr	y constr	uction			0	(11)
•• •	resent, use the value correspondence of the second s	ponding to the grea	ter wall area	a (after					
deducting areas of openi If suspended wooden t	floor, enter 0.2 (unseal	ed) or 0.1 (seal	ed). else	enter 0				0	(12)
If no draught lobby, en		, (,,					0	(13)
Percentage of window	s and doors draught st	ripped						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	= [00		Ì	0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	+ (15) =		0	(16)
	q50, expressed in cub	•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabi	-							0.15	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has	been done or a de	gree air per	meability	is being us	sed	1	0	
Shelter factor	,u		(20) = 1 - [0.075 x (1	9)] =			3 0.78	(19) (20)
Infiltration rate incorporation	ting shelter factor		(21) = (18)	x (20) =				0.12	(21)
Infiltration rate modified f	-						I	•••=	
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	beed 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		
		ļ							

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_	
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
	ate effec echanica		-	rate for t	he appli	cable ca	se							(220)
				andix N (2	(23a) – (23a) × Fmv (e	auation (I	N5)), othe	rwise (23b) – (23a)			0.5	(23a)
		• •	0 11		, (, (n Table 4h	,) – (238)			0.5	(23b)
			-	-	-							1 (00 -)	73.1	(23c)
	—		i		i		<u> </u>	HR) (24a	ŕ	, ,	r <u>, -</u>	<u> </u>	÷ 100] I	(24a)
(24a)m=		0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(24a)
,						·	, <u>, ,</u>	MV) (24b	í .	<i>,</i> ,	, 		1	(0.45)
(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	iter (24a) or (24b) or (24	c) or (24	d) in boy	(25)				1	
(25)m=	0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(25)
2 1 10	ot loopo													_
		s and ne Gros				Net Ar		U-valı	10	AXU		k-value		AXk
ELEN		area		Openin m		A,r		W/m2		(W/I	<)	k-value kJ/m²·l		kJ/K
Windo	ws					19.95	5 x1	/[1/(1.4)+	0.04] =	26.45				(27)
Floor						75.1	X	0.065		4.8815	Fir			(28)
Walls -	Type1	23.9	94	0		23.94	×	0.16	T_i	3.75	Fii			(29)
Walls 7	Tvpe2	28.7		0	=	28.78		0.16		4.51				(29)
Walls -		21.6		19.9	5	1.71	x	1.4		2.39			\dashv	(29)
Walls		10.8		0		10.83		0.16		1.7			\dashv	(29)
	area of e							0.10		1.7	L			
				ffoctivo wi	ndowlly	160.3		g formula 1	/[/1/ _volu	(0)	n aivon in	naragraph	22	(31)
	le the area						aleu using	g ioimula i	/[(1/0-valu	c)+0.0+j a	is given in	paragrapi	1 3.2	
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				43.69	(33)
Heat c	apacity (Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
	ign assess used instea				construct	ion are noi	t known pi	recisely the	e indicative	values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix l	<						24.05	(36)
if details	s of therma	l bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total f	abric hea	at loss							(33) +	(36) =			67.74	(37)
Ventila	ation hea	t 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=	19.97	19.76	19.56	18.53	18.33	17.3	17.3	17.1	17.71	18.33	18.74	19.15		(38)
Heat tr	ransfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	87.71	87.5	87.3	86.27	86.07	85.04	85.04	84.84	85.45	86.07	86.48	86.89		
									/	Average =	Sum(39)1	12 /12=	86.22	(39)

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.17	1.17	1.16	1.15	1.15	1.13	1.13	1.13	1.14	1.15	1.15	1.16		
Numbo	r of day		nth (Tab						I ,	Average =	Sum(40)1.	12 /12=	1.15	(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)
	01	20		00	01	00			00	01	00	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	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		36]	(42)
Reduce t	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.33]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г			-	ach month 1	1			· ·					1	
(44)m=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		-
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1083.95	(44)
(45)m=	147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		_
lf instanta	aneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	•	1421.23	(45)
(46)m=	22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
Water a	-		includir	na anv se	olar or W	/WHRS	storage	within sa	ame ves	sel		200		(47)
				ank in dw								200		()
	-	-			-			ombi boil	ers) ente	er '0' in ((47)			
Water s	-													
				oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
•			m Table								0	.6		(49)
0,			•	, kWh/ye				(48) x (49)) =		1.	34		(50)
Hot wa	ter stor	age loss	factor fr	cylinder rom Tabl								0]	(51)
	•	-	ee secti	on 4.3									1	
		from Ta		26								0		(52)
-			m Table							50)		0		(53)
		m watei (54) in (5	-	e, kWh/ye	ear			(47) x (51)) X (52) X (53) =		0 34		(54) (55)
	. ,	. , .		for each	month			((56)m = (55) x (41)	m	1.	34		(55)
г		r			1	40.00		1		 	40.00	44.00	1	(56)
(56)m= If cylinde	41.66 r contains	37.63 s dedicate	41.66 d solar sto	40.32 rage, (57)	41.66 m = (56)m	40.32 x [(50) – (41.66 [H11)] ÷ (5	41.66 60), else (5	40.32 7)m = (56)	41.66 m where (40.32 H11) is fro	41.66 m Append	lix H	(50)
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
Primary	/ circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary	/ circuit	loss cal	culated	for each	month (. ,	65 × (41)		r than a				
(mod (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	r thermo 23.26	22.51	23.26	1	(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	J	(00)

Combi	loss ca	alculated	for eac	ch	month (61)m =	(60)) ÷ 36	65 × (41)	m									
(61)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(61)
Total h	eat rec	quired for	water	he	ating ca	alculated	l fo	r eac	h month	(62)n	n =	0.85 × ((45)m	ı +	(46)m +	(57)ı	m +	(59)m + (61)m	
(62)m=	212.28	187.52	197.9	1	178.77	176.17	1:	58.83	153.88	167.0	D1	166.13	185.	31	194.24	207	.63		(62)
Solar DH	-IW input	calculated	using A	ppe	endix G or	Appendix	н (negati	ve quantity	v) (ente	er '0'	' if no sola	r contri	ibut	ion to wate	er hea	ting)		
(add a	dditiona	al lines if	FGHR	Sa	and/or V	VWHRS	ap	plies	, see Ap	pendi	хĢ	<u>3)</u>							
(63)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(63)
Output	from v	vater hea	ter				_		-				-		_				
(64)m=	212.28	187.52	197.9	1	178.77	176.17	1:	58.83	153.88	167.0	D1	166.13	185.	31	194.24	207	.63		_
										C	Dutp	out from wa	ater he	ate	r (annual)	12		2185.68	(64)
Heat g	ains fro	om water	heatin	g,	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61	I)m	n] + 0.8 >	(46))m	+ (57)m	+ (5	9)m]	
(65)m=	100.94	89.77	96.16	;	88.82	88.93	8	2.19	81.52	85.8	8	84.61	91.9	97	93.96	99.	39		(65)
inclu	ıde (57)m in calo	culation	n o	f (65)m	only if c	ylir	nder i	s in the c	dwellii	ng	or hot w	ater i	s fi	rom com	muni	ity h	eating	
5. Int	ternal g	ains (see	e Table	e 5	and 5a)):													
Metabo	olic gai	ns (Table	e 5), W	att	S														
	Jan	Feb	Ma		Apr	May		Jun	Jul	Au	g	Sep	00	ct	Nov	D	ес		
(66)m=	141.8	141.8	141.8		141.8	141.8	1	41.8	141.8	141.	8	141.8	141.	.8	141.8	141	.8		(66)
Lightin	g gains	(calcula	ted in <i>i</i>	Ap	pendix l	_, equat	ion	L9 o	r L9a), a	lso se	e T	Table 5							
(67)m=	46.56	41.35	33.63		25.46	19.03	1	6.07	17.36	22.5	7	30.29	38.4	6	44.89	47.	85		(67)
Applia	nces ga	ains (ca <mark>lc</mark>	ulated	in	Append	lix L, eq	uat	ion L	13 or L1	3a), a	lso	see Ta	ble 5						
(68)m=	311.79	315.02	306.8 ⁻	7	289.51	267.6	24	47.01	233.25	230.0	02	238.17	255.	53	277.44	298	.03		(68)
Cookin	ng gains	s (calcula	ited in	Ap	pendix	L, equat	ior	n L15	or L15a)	, also) SE	e Table	5						
(69)m=	51.54	51.54	51.54	Ť	51.54	51.54	5	1.54	51.54	51.5	4	51.54	51.5	54	51.54	51.	54		(69)
Pumps	and fa	ans gains	(Table	e 5a	a)														
(70)m=	0	0	0		0	0		0	0	0		0	0		0	0)		(70)
Losses	se.g. e	vaporatio	n (nec	jati	ve valu	es) (Tab	le	5)			!								
		-94.53		- T			r –	94.53	-94.53	-94.5	53	-94.53	-94.	53	-94.53	-94.	.53		(71)
		g gains (T		5)															
(72)m=	135.67		129.2	÷ r	123.36	119.53	1	14.15	109.57	115.4	43	117.52	123.	61	130.5	133	.59		(72)
Total i	nterna	l gains =						(66)	m + (67)m	+ (68)	m +	- (69)m + (ı (70)m -	+ (7	'1)m + (72)	m			
(73)m=	592.82	- -	568.5	5	537.14	504.97	4	76.03	458.99	466.8	33	484.79	516.4	41	551.63	578	.28		(73)
6. Sol	lar gain	is:											1						
Solar g	ains are	calculated	using so	olar	flux from	Table 6a	and	assoc	iated equa	tions to	o co	nvert to th	ie appl	icat	ole orientat	ion.			
Orienta		Access F	actor		Area			Flu				g_			FF			Gains	
		Table 6d			m²			Tal	ole 6a		Т	able 6b		Т	able 6c			(W)	
North	0.9x	0.77		x	19.	95	x	1	0.63	x		0.63	x		1		=	92.62	(74)
North	0.9x	0.77		x	19.	95	x	2	0.32	x		0.63	x		1		=	176.99	(74)
North	0.9x	0.77		x	19.	95	x	3	4.53	x		0.63	x		1		=	300.76	(74)
North	0.9x	0.77		x	19.	95	x	5	5.46	x		0.63	x		1		=	483.09	(74)
North	0.9x	0.77		x	19.	95	x	7	4.72	x		0.63	x	Ē	1		=	650.77	(74)

		_													
North 0.9x	0.77	×	19.9	95	x	79	9.99	×	0.	63	×	1	=	696.67	(74)
North 0.9x	0.77	x	19.9	95	x	74	4.68	×	0.	63	x	1	=	650.43	(74)
North 0.9x	0.77	x	19.9	95	x	59	9.25	×	0.	63	x	1	=	516.03	(74)
North 0.9x	0.77	x	19.9	95	x	4	1.52	x	0.	63	_ x [1	=	361.61	(74)
North 0.9x	0.77	x	19.9	95	x	24	4.19	x	0.	63	×	1	=	210.69	(74)
North 0.9x	0.77	x	19.9	95	x	1:	3.12	x	0.	63	×	1	=	114.25	(74)
North 0.9x	0.77	x	19.9	95	x	8	.86) × [0.	63	x	1	=	77.21	(74)
Solar gains in	watts, calcu	lated	for eacl	n month				(83)m	= Sum(74)m	(82)m		-		
(83)m= 92.62		0.76	483.09	650.77		96.67	650.43	516.	03 36	61.61	210.69	114.25	77.21		(83)
Total gains –	internal and	solar	(84)m =	= (73)m	+ (8	83)m ,	watts	-				•			
(84)m= 685.44	765.76 869	9.31	1020.23	1155.75	1	172.7	1109.42	982.	86 84	46.39	727.1	665.89	655.49		(84)
7. Mean inte	rnal tempera	iture (heating	season)										
Temperature	e during heati	ing p	eriods ir	n the livi	ng	area f	rom Tab	ole 9,	Th1 ('	°C)				21	(85)
Utilisation fa	ctor for gains	s for li	iving are	ea, h1,m	ı (s	ee Tal	ble 9a)								
Jan	Feb N	Mar	Apr	May		Jun	Jul	Αι	ug 🗄	Sep	Oct	Nov	Dec		
(86)m= 0.99	0.98 0.	.95	0.84	0.66	(0.46	0.34	0.3	9 C).66	0.91	0.98	0.99		(86)
Mean interna	al temperatur	re in I	iving are	ea T1 (fe	ollo	w ster	os 3 to 7	in Ta	able 9			•			
(87)m= 20.02	1 1).45	20.77	20.95		0.99	21	21		0.96	20.71	20.31	19.99		(87)
Tomporature	e during heat	inan	oriodo ir	root of	du	olling	from To		Th2	(°C)					
(88)m= 19.95		.95	19.96	19.96	T 7	9.97	19.97	19.9		(C) 9.97	19.96	19.96	19.95		(88)
					1					5.57	15.50	10.00	15.55		(00)
	ctor for gains	T				<u> </u>	_	<u>,</u>							(00)
(89)m= 0.98	0.97 0.	.93	0.81	0.59		0.39	0.26	0.3).57	0.87	0.97	0.99		(89)
Mean interna	al temperatur	re in t	he rest	of dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in	Table	e 9 <mark>c)</mark>				
(90)m= 18.67	18.9 19	9.28	19.72	19.92	1	9.97	19.97	19.9	98 1	9.94	19.65	19.1	18.63		(90)
										fl	LA = Livii	ng area ÷ (4	4) =	0.47	(91)
Mean interna	al temperatur	re (fo	r the wh	ole dwe	llin	g) = fL	A × T1	+ (1 -	– fLA)	x T2					
(92)m= 19.31	19.51 19	9.83	20.22	20.4	2	20.45	20.46	20.4	l6 2	0.42	20.15	19.68	19.28		(92)
Apply adjust	ment to the n	nean	internal	temper	atu	ire froi	m Table	4e, v	where	appro	priate	-			
(93)m= 19.31	19.51 19	9.83	20.22	20.4	2	20.45	20.46	20.4	6 2	0.42	20.15	19.68	19.28		(93)
8. Space he	ating requirer	ment													
	mean interna		•		ned	at ste	ep 11 of	Table	e 9b, s	o that	t Ti,m=	(76)m an	d re-calo	culate	
	n factor for ga	Mar			\mathbf{r}	lun	Jul	۸.		Son	Oct	Nov	Dee		
Jan Litilisation fa	ctor for gains		Apr	May		Jun	Jui	Αι	ig [·	Sep	OCI	INOV	Dec		
(94)m= 0.98	<u> </u>	.93	0.82	0.62		0.42	0.3	0.3	5 0	0.61	0.88	0.97	0.98		(94)
	, hmGm , W														
(95)m= 672.3	T 1	7.08	831.79	717.22	4	94.22	327.77	343.	36 51	8.93	640.68	642.68	645.06		(95)
	rage external							I						I	
(96)m= 4.3	1 1	6.5	8.9	11.7	-	14.6	16.6	16.4	4 1	4.1	10.6	7.1	4.2		(96)
Heat loss rat	te for mean ir	nterna	al tempe	erature,	Lm	ı, W =		x [(93	3)m– (9	96)m]]	•		I	
(97)m= 1316.5	1278.02 116	64.08	976.34	749.21	4	97.9	328.24	344.	43 54	40.45	822.05	1087.47	1309.86		(97)
Space heati	ng requireme	ent foi	r each m	nonth, k'	Wh	/mont	h = 0.02	24 x [((97)m	- (95))m] x (4	1)m			
<mark>(98)m=</mark> 479.28	361.18 26	5.61	104.07	23.8		0	0	0		0	134.94	320.25	494.61		

Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ =								2183.75	(98)					
Space	e heating	g requir	ement in	kWh/m²	²/year								29.08	(99)
8c. S	pace co	oling rea	quiremer	nt										
Calcu	lated for	r June, .	July and	August.	See Tat	ole 10b							1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			1	1 <u> </u>			T	1		r.		able 10)		(400)
(100)m=		0	0	0	0	799.38	629.3	644.75	0	0	0	0	I	(100)
(101)m=	ation fac			0	0	0.96	0.98	0.97	0	0	0	0		(101)
				L (100)m >			0.00	0.01	Ů	Ů	Ů	ů		(-)
(102)m=	i	0	0	0	0	771.25	618.59	624.46	0	0	0	0		(102)
Gains	s (solar g	gains ca	lculated	for appli	cable we	eather re	i egion, se	e Table	10)					
(103)m=	0	0	0	0	0	1290.32	1219.24	1069.98	0	0	0	0		(103)
						lwelling,	continu	ous (kW	h) = 0.0	24 x [(10))))) (102)m];	< (41)m	
•	<u> </u>		ì	< 3 × (98	í	070 70		004.47						
(104)m=	0	0	0	0	0	373.73	446.88	331.47		0	0	0	4450.00	
Cooler	d fractior	h								l = Sum(co <mark>oled</mark>		= 4) -	1152.09 0.91	(104)
	ittency fa		able 10b)					10-	ooolea			0.91	
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
						7		7	Tota	I = Sum(104)	=	0	(106)
		requir <mark>e</mark> i	men <mark>t for</mark>	month =	: (104)m	× (105)	× (106)ı	m		_		_		
(107)m=	0	0	0	0	0	85.47	102.2	75.81	0	0	0	0		_
									Total	l = Sum(107)	=	263.48	(107)
Spa <mark>ce</mark>	cooling	require	ment in I	<mark>‹Wh/</mark> m²/	/ear				(107)) ÷ (4) =			3.51	(108)
				mmunity										
								ting prov			unity scl	heme.	0	(301)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none									0					
Fraction of space heat from community system $1 - (301) =$									1	(302)				
	-		-					allows for See Appel		up to four	other heat	sources; ti	ne latter	
		• •	-			rom powe	1 Stations.	See Appel	nuix C.				1	(303a)
Fraction of heat from Community boilers (302) x (303a) = Fraction of total space heat from Community boilers (302) x (303a) =							1	` (304a)						
Factor for control and charging method (Table 4c(3)) for community heating system							1	(305)						
Distribution loss factor (Table 12c) for community heating system							1.05	(306)						
-	heating												kWh/yea	r
Annua	l space l	heating	requiren	nent									2183.75	
Space heat from Community boilers (98) x (304a) x (305) x (306) =							2292.94	(307a)						
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)							0	(308						
Space heating requirement from secondary/supplementary system $(98) \times (301) \times 100 \div (308) =$							0	(309)						
	heating											1		_
Annual water heating requirement							2185.68							
IT DHV	V from co	ommuni	ty schen	ne:										

Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2294.97	(310a)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] = 45.88	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Space cooling (if there is a fixed cooling s	system, if not enter 0)	= (107) ÷ (314) =	55.29	(315)
Electricity for pumps and fans within dwel mechanical ventilation - balanced, extract		e	204.72	(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) =	204.72	(331)
Energy for lighting (calculated in Appendiz	x L)		328.89	(332)
10b. Fuel costs – Community heating sc	heme			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.07	1 = 97.22	(340a)
Water heating from CHP	(310a) x	4.24 × 0.07	1 = 97.31	(342a)
11b. SAP rating - Community heating sc Energy cost deflator (Table 12)	(331) (332) = (340a)(342e) + (345)(354) = heme (355) × (356)] ÷ [(4) + 45.0] = g scheme	Fuel Price 13.19 13.19 13.19 13.19 13.19 13.19 13.19 13.19 13.19 13.19 13.19 x 0.07 x 0.07 x 0.07 x 0.07 x 0.07 x 0.07 <tr< td=""><td>1 = 27</td><td>(348) (349) (350) (351) (355) (355) (356) (357) (358)</td></tr<>	1 = 27	(348) (349) (350) (351) (355) (355) (356) (357) (358)
CO2 from other sources of space and war Efficiency of heat source 1 (%)		els repeat (363) to (366) for the second	l fuel 91	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] >		= 1089	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 23.81	(372)
Total CO2 associated with community sys		366) + (368)(372)	= 1112.81	(373)
CO2 associated with space heating (seco			= 0	(374)
CO2 associated with water from immersion			= 0	(375)
Total CO2 associated with space and wat	er heating (373) + ((374) + (375) =	1112.81	(376)
CO2 associated with space cooling	(315) x	0.52	= 28.69	(377)

CO2 associated with electricity for pump	velling (331)) x	0.52	=	106.25	(378)	
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	170.7	(379)
Total CO2, kg/year	sum of (376)(382) =				1418.45	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				18.89	(384)
El rating (section 14)					84.17	(385)
13b. Primary Energy – Community heat	ing scheme					
		Energy kWh/year	•		Energy Vh/year	
Energy from other sources of space and Efficiency of heat source 1 (%)		CHP) using two fuels repeat (363) t	o (366) for the secon	d fuel	91	(367a)
Energy associated with heat source 1	[(30	7b)+(310b)] x 100 ÷ (367b) x	0	=	6150.81	(367)
Electrical energy for heat distribution	[(313) x		=	140.85	(372)	
Total Energy associated with communit	y systems	(363)(366) + (368)(3	72)	=	6291.66	(373)
if it is negative set (373) to zero (unle	ss specified otherwis	e, see C7 in Appendix	C)	[6291.66	(373)
Energy associated with space heating ((309) x	0	=	0	(374)	
Energy associated with water from imm	ersion heater or insta	antaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and	water heating	(373) + (374) + (375) =			6291.66	(376)
Energy associated with space cooling		(315) x	3.07	=	169.74	(377)
Energy associated with electricity for pu	mps and fans within	dwelling (331)) ×	3.07	=	628.49	(378)
Energy associated with electricity for lig	hting	(332))) x	3.07	=	1009.7	(379)
Total Primary Energy, kWh/yea	sum of (3	76)(382) =			8099.59	(383)

		User I	Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Property	Address:	9R					
Address : 1. Overall dwelling dime	nsions:								
		Δre	a(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x	r	.05	(2a) =	410.53	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	134.6	(4)] [
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	410.53	(5)
2. Ventilation rate:									<u> </u>
		econdary	other		total			m ³ per hour	
Number of chimneys	heating h	eating +	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」	0	x 2	20 =	0](⁶ 0)
Number of intermittent fa		L	0		0	x ^	10 =	0	(00) (7a)
Number of passive vents						× ′	10 =	-](^{, ,} , , , , , , , , , , , , , , , , ,
·					0		40 =	0	
Number of flueless gas fi					0			o anges per hou	(7c) ur
Infiltration due to chimne				ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in t	peen carried out or is intende he dwelling (ns)	a, proceed to (17),	otherwise c	onunue no	0m (9) to (10)	[0	(9)
Additional infiltration	, , , , , , , , , , , , , , , , , , ,					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	rame or 0.35 fo	or masonr	y constr	uction		İ	0	(11)
•• •	resent, use the value correspondence of the second s	oonding to the grea	ter wall area	a (after					-
deducting areas of openii If suspended wooden f	ngs); if equal user 0.35 floor, enter 0.2 (unseale	ed) or 0.1 (seal	ed). else	enter 0				0	(12)
If no draught lobby, en								0	(13)
• ·	s and doors draught sti	ripped						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)
	q50, expressed in cub	•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabil	•							0.15	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has	been done or a de	gree air per	meability	is being us	sed	1	0	
Shelter factor	ju		(20) = 1 - [0.075 x (1	9)] =			2	(19) (20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed						I		
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	

Adjusted infiltra	tion rate (all	owing for sl	helter an	id wind sp	peed) =	(21a) x ((22a)m	-				
0.16	0.16 0.1		0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effect		ge rate for i	the appli	cable cas	se					Г	0.5	(23a)
If exhaust air hea		Appendix N, (2	23b) = (23a	a) × Fmv (eo	quation (I	N5)), other	wise (23b) = (23a)		Ĺ	0.5	(23b)
If balanced with				, ,				, , ,		L T	72.25	(23c)
a) If balanced	d mechanica	ventilation	with he	at recove	rv (MVI	HR) (24a)m = (2;	2b)m + ()	23b) x [L 1 – (23c)		(200)
(24a)m= 0.3	0.3 0.2		0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29		(24a)
b) If balanced	l mechanica	l ventilation	without	heat reco	overy (N	иV) (24b)m = (22	2b)m + (2	23b)			
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole ho	use extract	ventilation	or positiv	/e input v	entilatio	on from o	utside					
if (22b)m	< 0.5 × (23b), then (24	c) = (23b	o); otherw	vise (24	c) = (22b) m + 0.	.5 × (23b)	·		
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural v if (22b)m	entilation or = 1, then (2-							0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air c	hange rate	enter (24a	a) or (24b	o) or (24c) or (24	d) in box	(25)			-		
(25)m= 0.3	0.3 0.2	9 0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29		(25)
3. Heat losses	and heat lo	ss paramet	er:									_
ELEMENT	Gross	Openir		Net Are		U-valu					、	AXk
								A X U		k-value		
	are <mark>a (m²</mark>)		190 1 ²	A ,m	1 ²	W/m2	ĸ	(VV/I	<)	kJ/m ² ·k		kJ/K
Windows Type	area (m²) 1			A ,m 5.49	1 ² x1	W/m2 /[1/(1.4)+	K 0.04] =	(W/ł 7.28	<)			kJ/K (27)
Windows Type Windows Type	area (m²) 1 2			A ,m 5.49 17.39	x1	W/m2 /[1/(1.4)+ /[1/(1.4)+	K 0.04] = 0.04] =	(W/ł 7.28 23.05	<)			kJ/K (27) (27)
Windows Type Windows Type Windows Type	area (m²) 1 2 3			A ,m 5.49 17.39 4.58	1 ² x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K 0.04] = 0.04] = 0.04] =	(W/ł 7.28 23.05 6.07				kJ/K (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type	area (m²) 1 2 3			A ,m 5.49 17.39 4.58 21.96	1 ² x1 x1 x1 x1 x1	W/m2/ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K 0.04] = 0.04] = 0.04] = 0.04] =	(W/H 7.28 23.05 6.07 29.11				kJ/K (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Rooflights	area (m²) 1 2 3 4	n		A ,m 5.49 17.39 4.58 21.96 9	n ² x1 x1 x1 x1 x1 x1	W/m2/ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	<pre></pre>	(W/k 7.28 23.05 6.07 29.11 12.6				kJ/K (27) (27) (27) (27) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1	area (m²) 1 2 3 4 4	0		A ,m 5.49 17.39 4.58 21.96 9 44.4	1 ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (0.18	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99				kJ/K (27) (27) (27) (27b) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2	area (m²) 1 2 3 4 4 44.4 17.2	0 17.3	9	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19	1 ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + (0.18 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27				kJ/K (27) (27) (27) (27) (27b) (29) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3	area (m ²) 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 2 3.8	0 17.3 21.9	9	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84	1 x1 x1 x1 x2 x2 x3 x3 x4 x4	W/m21 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (0.18 1.4 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58				kJ/K (27) (27) (27) (27b) (29) (29) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4	area (m ²) 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 3.8 15.9	0 17.3 21.9 0	9	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9	1 x1 x1 x1 x2 x1 x3 x1 x4 x1 x4 x4 x4	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (1/(1.4)+(0.18 1.4 1.4 0.16	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.05] = 0.06] = 0.06] = 0.06] = 0.06] = 0.06] = 0.06] = 0.06] = 0.06] = 0.06] <td< td=""><td>(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49</td><td></td><td></td><td></td><td>kJ/K (27) (27) (27) (27b) (29) (29) (29) (29)</td></td<>	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5	area (m ²) 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 2 3.8 15.9 22.9	0 17.3 21.9 0	9 6	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9	1 x1 x1 x1 x2 x1 x3 x1 x4 x1 x4 x4 x4	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (0.18 1.4 1.4 0.16 0.18	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29) (29) (29) (29) (29
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type5 Walls Type6	area (m ²) 1 2 3 4 4 4 4 4 17.2 23.8 15.9 22.9 4.5	0 17.3 21.9 0 4.58	9 6 3	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9 -0.08	1 x1 x2 x3 x4	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (1/(1.4)+ (1/(1.4)+ (1.4)- 0.18 0.18 0.18 0.18 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29) (29) (29) (29) (29
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Walls Type6 Walls Type7	area (m ²) 1 2 3 4 4 4 4 4 17.2 23.8 15.9 22.9 4.5 16.5	0 17.3 21.9 0 4.58 16.4	9 6 3	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9 -0.08 0.03	p2 x1 x1 x1 x2 x x3 x x4 x x4 x x4 x x4 x x4 x x4 x4 x5 x4 x4 x4 x4 x4 x4 x4 x5 x4 x4 x4 x5 x4 x4 x4 x5 x4 <t< td=""><td>W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (1.4)+ (1.4) 1.4 0.16 0.18 1.4 1.4</td><td>0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =</td><td>(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11 0.04</td><td></td><td></td><td></td><td>kJ/K (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29</td></t<>	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (1.4)+ (1.4) 1.4 0.16 0.18 1.4 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11 0.04				kJ/K (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29
Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type5 Walls Type6	area (m ²) 1 2 3 4 4 4 4 4 4 4 2 3 4 2 3 4 2 2 3 4 2 2 3 4 2 2 3 4 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 2 3 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3	0 17.3 21.9 0 4.58	9 6 3	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9 -0.08	1 x1 x2 x3 x4	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ (1/(1.4)+ (1/(1.4)+ (1.4)- 0.18 0.18 0.18 0.18 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29) (29) (29) (29) (29

* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	123.93
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	0
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m ² K	Indicative Value: Medium	250
	· · · · · · · · · · · · · · · · · · ·	

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

(33) (34) (35)

can be ι	used inste	ad of a de	tailed calc	ulation.										
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix I	K						41.97	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)								
Total f	abric he	at loss							(33) +	(36) =			165.9	(37)
Ventila	ation hea	at loss ca	alculated	monthl	Ý		-		(38)m	= 0.33 × (25)m x (5)	_		
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	40.82	40.39	39.96	37.8	37.37	35.21	35.21	34.77	36.07	37.37	38.23	39.09		(38)
Heat ti	ransfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	206.72	206.29	205.85	203.69	203.26	201.1	201.1	200.67	201.97	203.26	204.13	204.99		
Heat lo	oss para	meter (H	HLP), W	/m²K			•	-		Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	203.59	(39)
(40)m=	1.54	1.53	1.53	1.51	1.51	1.49	1.49	1.49	1.5	1.51	1.52	1.52		
Numbe	er of day	/s in moi	nth (Tab	le 1a)				1	,	Average =	Sum(40) ₁ .	12 /12=	1.51	(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											
1 \//	tor hoo	ting enei		iromont:								kWh/ye	oor:	
4. vvc	aler nea		igy iequ	nement.						_		K V V I // y d	5ai.	
		upancy,							- / - / -			91		(42)
	A > 13. A £ 13.		+ 1.76 x	[1 - exp	(-0.0003	49 x (11	-A -13.9)2)] + 0.0)013 x (IFA -13.	9)			
			ater usag	ge in litre	es per da	y Vd,av	erage =	(25 x N)	+ 36		103	3.22		(43)
								to achieve	a water us	se target o				. ,
not more	e that 125	litres per j	berson pel	r day (all w	ater use, I	not and co	id)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from	l able 1c x	(43)						
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	105.28	109.41	113.54		_
Enerav	content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd.r	m x nm x D)))))))))))))))))))			m(44) ₁₁₂ = ables 1b. 1		1238.61	(44)
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
()											m(45) ₁₁₂ =		1624.02	(45)
lf instan	taneous v	vater heatii	ng at point	of use (no	hot water	[.] storage),	enter 0 in	boxes (46,			()			
(46)m=	25.26	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	storage							-						
-		. ,		• •			-	within sa	ame ves	sel		200		(47)
		-		nk in dw	-			. ,		(0) ((-)			
			hot wate	er (this in	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage		eclared I	oss facto	or is kno	wn (kWł	n/dav).				2	24		(48)
		actor fro					"day).							(40)
-				, kWh/ye	or			(48) x (49)	_			.6		
			-	cylinder l		or is not		(40) × (49)	_		1.	34		(50)
,				om Tabl								0		(51)
		neating s		on 4.3										
		from Ta										0		(52)
Iempe	erature f	actor fro	m Table	2b								0		(53)

•••		om water (54) in (5	-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54) (55)
	. ,	. , .		for each	month			((56)m = (55) × (41)	m	L'.	.04		(00)
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
· · ·	er contain	s dedicate	l d solar sto	l orage, (57)	I m = (56)m	x [(50) – (I [H11)] ÷ (5	0), else (5	I 7)m = (56)	m where (H11) is fro	m Append	l lix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3	-						0		(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mo	· · ·	factor fi	rom Tab	le H5 if t	here is s	solar wat	ter heatii	<u> </u>	cylinde	i	stat)	1	1	
(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	eat 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)ı	n
(62)m=	233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		(62)
			• • •				ve quantity	, ,		r contribut	ion to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)				1	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	i											
(64)m=	233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		_
											r (annual)₁		2388.47	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 [0.85	× (45)m	i + (61)m	1] + 0.8 x	<u>د [(46)</u> m	+ (57)m	+ (59)m]	
(65)m=	107.93	95.88	102.47	94.32	94.21	86.74	85.74	90.73	89.51	97.68	100.19	106.16		(65)
inclu	ide (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 5	5 and 5a):									
Metab	olic gair	s (Table	e 5), Wat	ts	-		i				- i	i		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	174.36	174.36		174.36	174.36		174.36	174.36		174.36	174.36	174.36		(66)
-	<u> </u>	·	· · · · · ·	· ·	· · ·	i	r L9a), a	i					1	()
(67)m=	67.57	60.02	48.81	36.95	27.62	23.32	25.2	32.75	43.96	55.82	65.15	69.45		(67)
		· · · · · · · · · · · · · · · · · · ·	r	· · ·	· · ·	1	13 or L1	, 			1	1	I	()
(68)m=	452.51	457.21	445.38	420.18	388.39	358.5	338.53	333.84	345.67	370.86	402.66	432.55		(68)
	<u> </u>	·		 i	· ·		or L15a)				· · · · ·		I	
(69)m=	55.34	55.34	55.34	55.34	55.34	55.34	55.34	55.34	55.34	55.34	55.34	55.34		(69)
•	r	ns gains	(Table :	5a)	1		1				1	1	1	
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0		(70)
		· · · · · · · · · · · · · · · · · · ·		tive valu	es) (Tab	le 5)								
(71)m=	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24		(71)
Water		gains (T	· · · ·		1		1				1	1	I	
(72)m=	145.06	142.68	137.73	131	126.63	120.47	115.24	121.94	124.32	131.29	139.16	142.69		(72)
		gains =	i		1	1)m + (67)m	r	r	r	1	i	1	
(73)m=	778.61	773.37	745.37	701.59	656.09	615.75	592.43	602	627.42	671.43	720.43	758.15		(73)
6. So	lar gains	S:												

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

Orientation	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North 0.9)x 1	x	21.96	x	10.63	x	0.63	x	1	=	132.4	(74)
North 0.9	9x 1	x	21.96	x	20.32	x	0.63	x	1	=	253.02	(74)
North 0.9)x 1	x	21.96	x	34.53	x	0.63	x	1	=	429.95	(74)
North 0.9	9x 1	x	21.96	x	55.46	x	0.63	x	1	=	690.61	(74)
North 0.9	9x 1	x	21.96	x	74.72	x	0.63	x	1	=	930.31	(74)
North 0.9)x 1	x	21.96	x	79.99	x	0.63	x	1	=	995.92	(74)
North 0.9)x 1	x	21.96	x	74.68	x	0.63	x	1	=	929.82	(74)
North 0.9)x 1	x	21.96	x	59.25	x	0.63	x	1	=	737.69	(74)
North 0.9)x 1	x	21.96	×	41.52	x	0.63	x	1	=	516.94	(74)
North 0.9	9x 1	x	21.96	x	24.19	x	0.63	x	1	=	301.19	(74)
North 0.9	9x 1	x	21.96	x	13.12	x	0.63	x	1	=	163.33	(74)
North 0.9	9x 1	x	21.96	x	8.86	x	0.63	x	1	=	110.37	(74)
East 0.9	3 3	x	5.49	x	19.64	x	0.63	x	1	=	183.41	(76)
East 0.9	3 3	x	5.49	x	38.42	x	0.63	x	1	=	358.79	(76)
East 0.9	3	x	5.49	x	63.27	x	0.63	x	1	=	590.88	(76)
East 0.9	3 3	x	5.49	×	92.28	х	0.63	x	1	=	861.76	(76)
East 0.5)x3	x	5.49	х	113.09	x	0.63	x	1	=	1056.12	(76)
East 0.9)x 3	x	5.49	х	115.77	×	0.63	x	1	=	1081.12	(76)
East 0.9	x 3	x	5.49	x	110.22	x	0.63	x	1	=	1029.27	(76)
East 0.9	9x 3	x	5.49	×	94.68	х	0.63	x	1	=	8 <mark>84.13</mark>	(76)
East 0.9)x 3	x	5.49	x	73.59	х	0.63	x	1	=	6 <mark>87.21</mark>	(76)
East 0.9	9x 3	x	5.49	×	45.59	x	0.63	x	1	=	4 <mark>25.73</mark>	(76)
East 0.9	3 3	x	5.49	×	24.49	x	0.63	x	1	=	228.69	(76)
East 0.9	-	x	5.49	x	16.15	x	0.63	X	1	=	150.83	(76)
South 0.9		x	17.39	x	46.75	x	0.63	x	1	=	460.98	(78)
South 0.9		x	17.39	x	76.57	x	0.63	x	1	=	754.97	(78)
South 0.9		x	17.39	x	97.53	x	0.63	x	1	=	961.7	(78)
South 0.9		x	17.39	×	110.23	X	0.63	X	1	=	1086.93	(78)
South 0.9		x	17.39	×	114.87	X	0.63	X	1	=	1132.64	(78)
South 0.9		x	17.39	x	110.55	X	0.63	X	1	=	1090.02	(78)
South 0.9		x	17.39	X	108.01	X	0.63	X	1	=	1065.01	(78)
South 0.9		x	17.39	X	104.89	X	0.63	X	1	=	1034.27	(78)
South 0.9		x	17.39	×	101.89	X	0.63	X	1	=	1004.61	(78)
South 0.9	·	x	17.39	×	82.59	X	0.63	X	1	=	814.3	(78)
South 0.9		X	17.39	x	55.42	x	0.63	x	1	=	546.42	(78)
South 0.9		X	17.39	×	40.4	x	0.63	x	1	=	398.33	(78)
West 0.9		X	4.58	×	19.64	x	0.63	X	1	=	51	(80)
West 0.9		X	4.58	×	38.42	x	0.63	x	1	=	99.77	(80)
West 0.9	0x 1	x	4.58	x	63.27	x	0.63	x	1	=	164.31	(80)

10/	г														
West	0.9x	1	X	4.5		x	92.28	_ ×	0.6			1	=	239.64	(80)
West	0.9x	1	x	4.5	8	x	113.09	×	0.6	63	×	1	=	293.69	(80)
West	0.9x	1	x	4.5	8	x	115.77	×	0.6	63	×	1	=	300.64	(80)
West	0.9x	1	x	4.5	8	x	110.22	×	0.6	63	×	1	=	286.22	(80)
West	0.9x	1	x	4.5	8	x	94.68	×	0.6	63	x	1	=	245.86	(80)
West	0.9x	1	x	4.5	8	x	73.59	×	0.6	63	×	1	=	191.1	(80)
West	0.9x	1	x	4.5	8	x	45.59	×	0.6	63	x	1	=	118.39	(80)
West	0.9x	1	x	4.5	8	x	24.49	×	0.6	63	x	1	=	63.59	(80)
West	0.9x	1	x	4.5	8	x	16.15	×	0.6	63	×	1	=	41.94	(80)
Roofligh	nts <mark>0.9x</mark>	1	x	9		x	26	x	0.6	63	×	1	=	132.68	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9		x	54	×	0.6	63	×	1	=	275.56	(82)
Roofligh	nts 0.9x	1	x	9		x	96	×	0.6	63	x	1	=	489.89	(82)
Roofligh	nts 0.9x	1	x	9		x	150	×	0.6	63	x	1	=	765.45	(82)
Roofligh	nts 0.9x	1	x	9		x	192	×	0.6	63	x	1	=	979.78	(82)
Roofligh	nts 0.9x	1	x	9		x	200	×	0.6	63	x [1	=	1020.6	(82)
Roofligh	nts 0.9x	1	x	9		x	189	ا × آ	0.6	63		1	=	964.47	(82)
Roofligh	nts 0.9x	1	x	9		x	157	×	0.6	63		1	=	801.17	(82)
Roofligh	nts 0.9x	1	x	9		x	115	x	0.6	63	x	1	=	586.84	(82)
Roof <mark>lig</mark> h	its 0.9x	1	×	9		x	66	7 x	0.6	63	×	1	=	336.8	(82)
Roof <mark>lig</mark> h	its 0.9x	1	×	9		x	33	i 🖌	0.6	63	×	1	=	168.4	(82)
Roofligh	its 0.9x	1	×	9		x	21	٦×	0.6	63	×	1	=	107.16	(82)
								-					_		
Solar g	ains in v	watts, cal	culated	for each	n month	ı		(83)m	r = Sum(1	74)m	.(<mark>8</mark> 2)m				
(83)m=	960.47	1742.12	2636.72	3644.38	4392.53	4	488.3 4274.79	3703	3.13 29	86.7	19 <mark>96.4</mark>	2 1170.44	808.64		(83)
Total g	ains – ir	nternal ar	nd solar	(84)m =	= (73)m	+ (8	33)m, watts								
(84)m=	1739.08	2515.48	3382.09	4345.97	5048.62	51	04.05 4867.23	3 4305	5.12 36 ⁻	4.12	2667.8	5 1890.87	1566.79		(84)
7. Mea	an interi	nal tempe	erature	(heating	seasor	า)									
Temp	erature	during he	eating p	eriods ir	h the livi	ing	area from Ta	able 9,	. Th1 (°	C)				21	(85)
Utilisa	tion fac	tor for ga	ins for I	iving are	ea, h1,n	n (s	ee Table 9a)								
]	Jan	Feb	Mar	Apr	May		Jun Jul	A	ug S	Sep	Oct	Nov	Dec		
(86)m=	0.97	0.89	0.75	0.54	0.37	(0.25 0.18	0.2	21 0	.38	0.7	0.93	0.98		(86)
Mean	internal	tempera	ture in l	living are	ea T1 (f	ollo	w steps 3 to	7 in T	able 90	:)					
(87)m=	19.85	20.3	20.7	20.93	20.99	T	21 21	2		0.99	20.84	20.29	19.75		(87)
Tomp	oroturo	during he		oriodo in	root of		ulling from T) Th2/						
(88)m=	19.66	19.66	19.67	19.68	19.68	-	elling from T 9.69 19.69	19.0		9.69	19.68	19.68	19.67		(88)
						-						10.00			(-•)
Utilisa		tor for ga 0.87				1	m (see Table	<u> </u>		<u></u>	0.04		0.07		(90)
(00)				0.49	0.32	1	0.2 0.13	0.1	5 0	.31	0.64	0.9	0.97		(89)
(89)m=	0.96		0.7				•					-			
Mean	internal	tempera	ture in t	the rest		—	T2 (follow st	- i	-						
					of dwell 19.67	—	T2 (follow st 9.69 19.69	teps 3	-	9.68	19.54	18.85 ing area ÷ (4	18.09	0.47	(90) (91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

		_		_	_				_					
(92)m=	18.98	19.53	19.99	20.23	20.29	20.3	20.31	20.31	20.29	20.15	19.53	18.87		(92)
Apply	adjustn	nent to t	he mear	n interna	l temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.98	19.53	19.99	20.23	20.29	20.3	20.31	20.31	20.29	20.15	19.53	18.87		(93)
8. Sp	ace hea	ting requ	uirement	t				•						
Set T	i to the r	mean int	ternal te	mperatu	re obtair	ned at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a							i		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	n:										
(94)m=	0.95	0.87	0.72	0.51	0.34	0.22	0.15	0.18	0.34	0.66	0.9	0.96		(94)
Usefu			1	4)m x (8-	-							-		
(95)m=	1654.51	2179.29	2419.31	2221.11	1730.22	1145.24	744.97	783.41	1240.36	1759.48	1701.65	1510.8		(95)
Month	nly aver	age exte	ernal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	3035.23	3017.46	2776.19	2307.46	1745.51	1147.2	745.26	784	1251.14	1940.67	2536.65	3007.06		(97)
Space	e heatin	g require	ement fo	or each n	nonth, k	Wh/mont	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	1027.26	563.25	265.52	62.18	11.37	0	0	0	0	134.8	601.2	1113.22		
			-	-		-		Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	3778.79	(98)
Space	e heatin	a require	ement in	kWh/m²	²/vear								28.07	(99)
_					/) 00									
			quiremer											
Calcu				August.				A 1107	Can	Oct	Nevi			
Llest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct				
пеат (100)m=						1890.38		1525.11				able 10)		(100)
· · ·						1690.36	1400.17	1525.11	0	0	0	0		(100)
		tor for lo		0	0	0.99	0.99	0.00		0	0	0		(101)
(101)m=					-		0.99	0.99	0	0	U	0		(101)
	· · · ·	im∟m (v l o	vatts) = 0	(100)m x 0		1869.94	1400.40	4544.40	0	0	0		l	(102)
(102)m=	0	-	-	-	-		1480.12		-	0	0	0		(102)
	s (solar g	\int_{0}^{0}		for appli		5104.05	-	i		0	0		l	(103)
(103)m=	-		-	Ů	_				0	0	0	0	(11)	(103)
				r montn, < 3 × (98		iweiling,	continuo	ous (kvv	(n) = 0.0.	24 X [(10)3)m – (102)m]:	x (41)m	
(104)m=		0			0	2328.56	2520.01	2078.73	0	0	0	0		
(,	Ŭ	Ů			Ů			2010110		= Sum(_	=	6927.3	(104)
Cooler	d fractior	n									area ÷ (4		0.91	(104)
			able 10b))						coolog		") —	0.01	
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
			1	1					Total	' = Sum((104)	=	0	(106)
Space	coolina	requirer	ment for	month =	: (104)m	× (105)	× (106)r	n	, ota,	ounq	1.000		0	
(107)m=		0	0	0	0	527.65	571.03	471.03	0	0	0	0		
		I			I	1	I		Total	= Sum(107)	=	1569.71	(107)
Space	cooling	requirer	ment in I	×Wh/m²/y	/eor					÷ (4) =	,			(108)
	coomig	redning		<u>/</u>	year				(107)	÷ (4) =			11.66	
					In the second second									
				mmunity					.,		• •			
This pa	art is use	ed for sp	bace hea	mmunity ating, spa	ace cool	ing or wa	ater heat				unity scł	neme.	0	(301)

Fraction of space heat from community syste	em 1 – (301) =		1	(302)
The community scheme may obtain heat from several s includes boilers, heat pumps, geothermal and waste he Fraction of heat from Community boilers	•	•	the latter	(303a)
Fraction of total space heat from Community	, boilers	(302) x (303a) =	[(304a)
			1	(304a)
Factor for control and charging method (Tab		aling system	1	
Distribution loss factor (Table 12c) for comm	iunity neating system		1.05	(306)
Space heating Annual space heating requirement			kWh/year 3778.79]
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	3967.73	(307a)
Efficiency of secondary/supplementary heat	ing system in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/	supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2388.47	1
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x (305) x (306) =	2507.9	(310a)
Electricity used for heat distribution	0.0	1 × [(307a)(3 <mark>07e) + (310a)(310e)]</mark> =	64.76	(313)
Cooling System Energy Efficiency Ratio			4.77	(314)
Spa <mark>ce co</mark> oling (if there is a fixed cooling sys	tem, if not enter 0)	= (107) ÷ (314) =	329.39	(315)
Electricity for pumps and fans within dwelling				-
mechanical ventilation - balanced, extract or	positive input from outside	e	462.78	(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) =	462.78	(331)
Energy for lighting (calculated in Appendix L)		477.34	(332)
10b. Fuel costs – Community heating sche	me			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.01 =	168.23	(340a)
Water heating from CHP	(310a) x	4.24 × 0.01 =	106.33	(342a)
		Fuel Price		_
Space cooling (community cooling system)	(315)	13.19 × 0.01 =	43.45	(348)
Pumps and fans	(331)	13.19 × 0.01 =	61.04	(349)
Energy for lighting	(332)	13.19 × 0.01 =	62.96	(350)
Additional standing charges (Table 12)			120	(351)
Total energy cost = (3	40a)(342e) + (345)(354) =		562.02	(355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12)			Г	0.42	(356)
Energy cost factor (ECF) [(355) x (356)] ÷ [(4) + 4	5.0] =			1.31	(357)
SAP rating (section12)				81.67	(358)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%) If there is CHP	IP) using two fuels repeat (363) to	(366) for the seco	nd fuel	91	(367a)
CO2 associated with heat source 1 [(30	7b)+(310b)] x 100 ÷ (367b) x	0] = [1537.07	(367)
Electrical energy for heat distribution	[(313) x	0.52] = [33.61	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372	2)	= [1570.68	(373)
CO2 associated with space heating (secondary)	(309) x	0] = [0	(374)
CO2 associated with water from immersion heater or instan	taneous heater (312) x	0.22] = [0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =]	1570.68	(376)
CO2 associated with space cooling	(315) x	0.52] = [170.95	(377)
CO2 associated with electricity for pumps and fans within de	welling (331)) x	0.52] = [240.18	(378)
CO2 associated with electricity for lighting	(332))) x	0.52] = [247.74	(379)
Total CO2, kg/year sum of (376)(382) =				2229.56	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =				16.56	(384)
El rating (section 14)				83.37	(385)
13b. Primary Energy – Community heating scheme					
	Energy kWh/year	Primary factor		Ene <mark>rgy</mark> Vh/year	
Energy from other sources of space and water heating (not Efficiency of heat source 1 (%) If there is CHP	CHP) using two fuels repeat (363) to	(366) for the seco	nd fuel	91	(367a)
Energy associated with heat source 1 [(30	7b)+(310b)] x 100 ÷ (367b) x	0] = [8681.61	(367)
Electrical energy for heat distribution	[(313) x] = [198.8	(372)
Total Energy associated with community systems	(363)(366) + (368)(372	2)	= [8880.41	(373)
if it is negative set (373) to zero (unless specified otherwis	se, see C7 in Appendix C)	[8880.41	(373)
Energy associated with space heating (secondary)	(309) x	0] = [0	(374)
Energy associated with water from immersion heater or inst	antaneous heater(312) x	1.22] = [0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =		[8880.41	(376)
Energy associated with space cooling	(315) x	3.07] = [1011.23	(377)
Energy associated with electricity for pumps and fans within	dwelling (331)) x	3.07] = [1420.74	(378)
Energy associated with electricity for lighting	(332))) x	3.07] = [1465.44	(379)
Total Primary Energy, kWh/year sum of (3	76)(382) =			12777.82	(383)

			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 2012	2		Stroma Softwa				Versio	n: 1.0.4.7	
		Pro	operty A	Address:	5					
Address :										
1. Overall dwelling dimen	isions:									
One word file an			Area	· ·		Av. Hei	,	1	Volume(m ³	
Ground floor				6.8	(1a) x	2.	.85	(2a) =	275.88	(3a)
Total floor area TFA = (1a))+(1b)+(1c)+(1d)+(1e)	+(1n)	9	6.8	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	275.88	(5)
2. Ventilation rate:										
		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				Ē	0	x .	10 =	0	(7a)
Number of passive vents					Ē	0	x '	10 =	0	(7b)
Number of flueless gas fire	es				Γ	0	×	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 i	to (17), o	therwise c	ontinue fro	om (9) to ((16)	1		
Number of storeys in the Additional infiltration	e dweining (ris)						[(9)	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0.2	25 for steel or timber fr	ame or 0).35 for	masonr	v constru	uction	[(0)	11000 -	0	
if both types of wall are pre	sent, use the value corresp				•				Ŭ	
deducting areas of opening		d) or 0.1	(acala	d) alaa	ontor O				_	
If suspended wooden flo		u) 01 0.1	(Seale	u), eise i					0	(12)
Percentage of windows		inned							0	(13) (14)
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, q	50, expressed in cubi	c metres	per ho	ur per so	quare me	etre of e	nvelope	area	3	(17)
If based on air permeabilit	y value, then (18) = [(17) ÷ 20]+(8),	, otherwis	se (18) = (*	16)				0.15	(18)
Air permeability value applies		been done	or a deg	ree air per	meability i	is being us	sed			
Number of sides sheltered				(20) = 1 - [0 075 v (1	0)1			2	(19)
Shelter factor	a abaltar factor			(20) = 1 - [(21) = (18)		9)] =			0.85	(20)
Infiltration rate incorporation	-			(21) = (10)	x (20) =				0.13	(21)
Infiltration rate modified fo		lun	11	Aug	Son	Oct	Nov	Dee		
	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	<u> </u>		2.0	0.7	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 infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
	ate effec echanica		-	rate for t	he appli	cable ca	se					Г	0.5	(23a)
				endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	o) = (23a)		l	0.5	(23b)
			• • •		, ,	or in-use f	• •			, , ,		l	77.35	(200) (23c)
a) If	balance	d mech	anical ve	entilation	with he	at recove	erv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [l 1 – (23c)		(200)
(24a)m=		0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26]	(24a)
b) If	balance	d mech	anical ve	entilation	without	heat rec	covery (N	u MV) (24b	m = (2)	1 2b)m + (j	23b)	1]		
, (24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	tilation of	or positiv	ve input v	ventilatio	on from o	outside		<u> </u>			
	if (22b)n	n < 0.5 ×	< (23b), t	hen (24	c) = (23b); otherv	wise (24	c) = (22k	o) m + 0	.5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,					•	ve input								
	<u> </u>	1	r <u>í í</u>	r Ì	, 	erwise (2	<u>,</u>	1	r [′]					(244)
(24d)m=		0	0	0	0	0	0	0	0	0	0	0		(24d)
				· · ·		o) or (240	<u>, ,</u>	· · · · · · · · · · · · · · · · · · ·	r í	0.05	0.26			(25)
(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26		(25)
3. He	at l <mark>osse</mark>	s and he	eat loss	oaramete	er:									_
ELEN		Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²·k		A X k kJ/K
Windo	ws Type	e 1				5.13	x1	/[1/(1.4)+	0.04] =	6.8				(27)
Win <mark>do</mark>	ws Type	92				22.8	x1	/[1/(1.4)+	0.04] =	30.23				(27)
Wall <mark>s</mark> [·]	Type1	32.2	21	0		32.21	x	0.18		5.8				(29)
Walls ⁻	Type2	11.6	69	0		11.69	x K	0.18	=	2.1	٦ i		┓ ┌─	(29)
Walls ⁻	ТуреЗ	24.2	23	22.8		1.43	x	1.4	=	2			7	(29)
Walls ⁻	Type4	10.5	55	0		10.55	5 X	0.16	=	1.65	i F		┐	(29)
Walls ⁻	Type5	15.3	39	15.3		0	x	1.4	=	0	= i		i –	(29)
Total a	area of e	lements	, m²			94.05	5							(31)
* for win	ndows and	roof wind	ows, use e	effective wi	ndow U-va	alue calcul	ated using	g formula 1	/[(1/U-valu	ue)+0.04] a	as given in	paragraph	3.2	
				nternal wal	ls and par	titions		(00) (00)	(22)					
			= S (A x	U)				(26)(30)		(0.0) (0.			62.18	(33)
	apacity		. ,							(30) + (32		(32e) =	0	(34)
						n kJ/m²K		ra aia alu thu		ative Value		iable 1f	250	(35)
	0		tailed calc		construct	ion are not	t known pr	ecisely the	emuicative	e values of		adie II		
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<]	14.11	(36)
if details	s of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	1)								
	abric he								(33) +	- (36) =			76.29	(37)
Ventila				d monthly		1			r	i = 0.33 × (1			
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		/
(38)m=	25.11	24.82	24.53	23.08	22.79	21.34	21.34	21.05	21.92	22.79	23.37	23.95		(38)
	ransfer o	· · · · · ·	r	1		1	1		(39)m	i = (37) + (1	· · · · ·		
(39)m=	101.4	101.11	100.82	99.37	99.08	97.62	97.62	97.33	98.21	99.08	99.66	100.24		 ,
										Average =	: Sum(39)₁	12 /12=	99.29	(39)

Heat lo	ss para	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.05	1.04	1.04	1.03	1.02	1.01	1.01	1.01	1.01	1.02	1.03	1.04		
Numbo	r of dov	/s in mor	th (Tab					1	,	Average =	Sum(40) ₁ .	12 /12=	1.03	(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. Wat	ter heat	ting ener	gy requi	rement:								kWh/ye	ear:	
if TF/	A > 13.9	upancy, I 9, N = 1 9, N = 1		[1 - exp	(-0.0003	849 x (TF	-13.9)2)] + 0.(0013 x (⁻	TFA -13.		71		(42)
Reduce t	he annua		hot water	usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.51		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage i	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					L	
(44)m=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42	108.36		—
Energy c	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1182.14	(44)
(45)m=	160.7	140.55	145.03	126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		_
lf instanta	aneous w	vater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1549.97	(45)
(46)m=	<mark>2</mark> 4.1	21.08	21.76	18. <mark>97</mark>	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
Water s	-													
-				-				within sa	ame ves	sel		200		(47)
	•	eating a			•			(47) ombi boil	ers) ente	er 'O' in <i>(</i>	47)			
Water s			not wate			notantai								
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
Tempe	rature f	actor fro	m Table	2b							0	.6		(49)
		m water	-	•				(48) x (49)) =		1.	34		(50)
		urer's de age loss		•								-		(54)
		leating s					iy)					0		(51)
	-	from Tal										0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or ((54) in (5	5)								1.	34		(55)
Water s	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
If cylinde	r contains	s dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
Primary	/ circuit	loss (an	nual) fro	om Table	e 3							0		(58)
						,	• •	65 × (41)						
, r	-				1	1	i	ng and a		1	, 		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 montl	n (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 rec	uired for	water h	neating	calculate	d fo	or eac	h month	(62)m	= 0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m		
(62)m=	225.63	199.19	209.96	189.2	3 186.25	1	67.53	161.94	176.2	5 175.49	196.22	206.14	220.55		(62)	
Solar DI	HW input	calculated	using Ap	pendix G	or Appendi	хH	(negati	ve quantity	/) (enter	'0' if no sola	ar contribu	tion to wate	er heating)	-		
(add a	dditiona	al lines if	FGHR	S and/o	WWHR	S aj	oplies	, see Ap	pendix	G)				_		
(63)m=	0	0	0	0	0		0	0	0	0	0	0				
Output	t from w	vater hea	ter													
(64)m=	225.63	199.19	209.96	189.2	3 186.25	1	67.53	161.94	176.2	5 175.49	196.22	206.14	220.55			
		-			-				0	utput from w	ater heate	er (annual)	112	2314.43	(64)	
Heat g	jains fro	om water	heating	g, kWh/i	month 0.2	25 ´	[0.85	× (45)m	+ (61)	m] + 0.8 :	x [(46)m	+ (57)m	+ (59)m]		
(65)m=	105.37	93.65	100.16	92.31	92.28	8	35.08	84.2	88.96	87.72	95.59	97.92	103.69		(65)	
inclu	ude (57))m in calo	culation	of (65)	m only if	cyli	nder i	s in the c	dwellin	g or hot w	/ater is f	rom com	munity h	neating		
5. In	ternal g	ains (see	Table	5 and 5	a):											
		ns (Table														
motab	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec]		
(66)m=	135.39	135.39	135.39	<u> </u>		1	35.39	135.39	135.3		13 <mark>5.39</mark>	135.39	135. <mark>3</mark> 9		(66)	
Lightin	g gains	(calcula	ted in A	ppendi	x L, equa	tior	L9 o	r L9a), a	lso see	Table 5						
(67)m=	22.38	19.88	16.17	12.24			7.72	8.35	10.85		18.49	21.58	23		(67)	
Applia	nces da	ains (calc	ulated i	n Appe	ndix L. eo	Jua	tion L	13 or L1	3a), al	so see Ta	ble 5					
(68)m=	251.05		247.09			·	98.89	187.81	185.2		205.75	223.39	239.97	1	(68)	
	L		<u> </u>	· · · ·		-			also	see Table						
(69)m=	36.54	36.54	36.54	36.54		-	36.54	36.54	36.54		36.54	36.54	36.54	1	(69)	
		ins gains	I (Table	5a)		-										
(70)m=				00)	0		0	0	0	0	0	0	0	1	(70)	
					lues) (Tal			-		1 -				J		
			- <u>-</u>	-	1 -108.31	-		-108 31	-108 3	1 -108.31	-108 31	-108 31	-108 31	1	(71)	
		gains (1				Ι.	00.01	100.01	100.0		100.01	100.01		J	()	
(72)m=	141.63	, , ,	134.63		1 124.03	1	18.16	113.17	119.5	7 121.84	128.49	136	130 37	1	(72)	
				120.2	124.00	<u> </u>		-		n + (69)m +				J	()	
(73)m=	478.68	I gains = 476.51	461.5	437.1	3 412.27		88.39	372.95	379.24		416.34	444.58	· · · · ·	1	(73)	
. ,	lar gain		401.5	437.10	412.27	13	00.59	572.95	319.24	1 391.79	410.54	444.38	405.90		(10)	
			usina sol	ar flux fro	m Table 6a	and	lassoc	iated equa	tions to	convert to th	ne applica	ble orientat	tion.			
		Access F	-	Are			Flu			g_		FF		Gains		
•		Table 6d		m				ole 6a		Table 6b	Т	able 6c			(61)m (62) (63) (43 (64) (65) (65) (66) (67) (68) (69) (70) (70) (71) (72) (71) (72) (73)	
East	0.9x	3		<	5.13	x	1	9.64	x [0.63	□ × [1		131.97	(76)	
East	0.9x	3			5.13	x		8.42	^ L x [0.63		1				
East	0.9x	3			5.13	x		3.27	^ L x [0.63		1				
East	0.9x	3			5.13	x		2.28	^ _ x [0.63		1				
East	0.9x	3			5.13	x		13.09	^ L x [0.63		1			-	
	0.07	5		`	5.15	^	I	13.09	_ ^ _	0.03	^ L	1		759.00	(10)	

	-										_					_
East	0.9x	3	x	5.1	13	x	1	15.77	x	0.63	x	1		= L	777.88	(76)
East	0.9x	3	x	5.1	13	x	1	10.22	x	0.63	x	1		=	740.57	(76)
East	0.9x	3	X	5.1	13	x	g	94.68	x	0.63	x	1	:	=	636.14	(76)
East	0.9x	3	x	5.1	13	x	7	3.59	x	0.63	x	1		- [494.46	(76)
East	0.9x	3	x	5.1	13	x	4	5.59	x	0.63	x	1	:	-	306.32	(76)
East	0.9x	3	×	5.1	13	x	2	24.49	x	0.63	x	1	:	= [164.55	(76)
East	0.9x	3	×	5.1	13	x	1	6.15	x	0.63	x	1	:	- [108.52	(76)
South	0.9x	0.77	×	22	.8	x	4	6.75	x	0.63	x	1		- [465.38	(78)
South	0.9x	0.77	×	22	.8	x	7	6.57	x	0.63	x	1	:	= [762.18	(78)
South	0.9x	0.77	×	22	.8	x	9	97.53	x	0.63	x	1		- [970.88	(78)
South	0.9x	0.77	×	22	.8	x	1	10.23	x	0.63	x	1		- Г	1097.3	(78)
South	0.9x	0.77	×	22	.8	x	1	14.87	x	0.63	x	1		- Г	1143.46	(78)
South	0.9x	0.77	×	22	.8	x	1	10.55	x	0.63	x	1		- Г	1100.42	(78)
South	0.9x	0.77	×	22	.8	x	1	08.01	x	0.63	x	1		- Г	1075.18	(78)
South	0.9x	0.77	×	22	.8	x	1	04.89	x	0.63	x	1	:	- Г	1044.15	(78)
South	0.9x	0.77	×	22	.8	x	1	01.89	x	0.63	×	1		- Г	1014.2	(78)
South	0.9x	0.77	×	22	.8	x	6	32.59	x	0.63	×	1		- Г	822.08	(78)
South	0.9x	0.77	×	22	.8	x	5	5.42	х	0.63	x	1		- 1	551.64	(78)
South	0.9x	0.77	×	22	.8	x		40.4	x	0.63	x	1		- [402.13	(78)
											_					
Solar o	ains in	watts, ca	Iculate	d for eac	h month	٦			(83)m	= Sum(74)m	<mark>(8</mark> 2)m					
(83)m=	<mark>59</mark> 7.35		1396.02	1	1	-	878.3	1815.75	1680	0.29 1508.65	1128.	4 716.18	510.6	5		(83)
Tota <mark>l g</mark>	ains – i	nternal a	nd sola	r (84)m =	- = (73)m	+ (83)m	, watts								
(84)m=	1076.03	1496.83	1857.52	2154.52	2315.61	22	66.69	2188.7	2059	9.53 1900.44	1544.7	4 1160.76	976.6	1		(84)
7. Me	an inter	nal temp	erature	(heating	seaso	n)							-			
				, c		<i>.</i>	area	from Tab	ole 9,	Th1 (°C)				Г	21	(85)
		tor for ga				-										
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Au	ug Sep	Oct	Nov	De	с		
(86)m=	0.97	0.88	0.73	0.55	0.4		0.28	0.2	0.2	2 0.36	0.64	0.91	0.98			(86)
Mean	interna	l tempera	ature in	living an	ea T1 (f	follo	w ste	ns 3 to 7	' in T	able 9c)		I				
(87)m=	20.35	20.69	20.89	20.98	21	T	21	21	21	<u>/</u>	20.96	20.67	20.28	3		(87)
						L		from To								
(88)m=	20.04	20.05	20.05	20.06	20.06	-	20.08	20.08	20.0	9, Th2 (°C) 08 20.07	20.06	20.06	20.05	5		(88)
						<u> </u>				20.07	20.00	20.00	20.00	<u> </u>		(00)
		tor for ga		T	<u> </u>	1			· · ·					_		(00)
(89)m=	0.96	0.85	0.69	0.51	0.36		0.24	0.16	0.1	7 0.31	0.59	0.89	0.97			(89)
Mean	interna	l tempera	ature in	the rest	of dwel	ling	T2 (f	ollow ste	ps 3	to 7 in Tab	le 9c)		r	_		
(90)m=	19.23	19.68	19.93	20.04	20.06	2	20.08	20.08	20.0		20.03		19.13	3		(90)
										1	fLA = Li	ving area ÷ (4) =		0.41	(91)
Mean	interna	l tempera	ature (fo	or the wh	ole dwe	əllin	g) = f	LA x T1	+ (1	– fLA) × T2						
Mean (92)m=	interna 19.69	l tempera 20.09	ature (fo 20.33	or the wh 20.43	20.45	_	g) = f 20.46	LA × T1 20.46	+ (1 · 20.4		20.41	20.09	19.6			(92)

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

(93)m=	19.69	20.09	20.33	20.43	20.45	20.46	20.46	20.46	20.45	20.41	20.09	19.6		(93)
8. Spa	ace hea	ting requ	uirement	t										
				mperatui using Ta		ned 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	tion fac	tor for g	ains, hm	<u></u> 1:					i					
(94)m=	0.95	0.86	0.7	0.52	0.37	0.25	0.17	0.19	0.33	0.61	0.89	0.97		(94)
Usefu	l gains,	hmGm ,	W = (9	4)m x (84	4)m	1								
(95)m=	-		,	1128.55	864.11	571.48	376.43	394.9	622.95	942.77	1030.99	945.7		(95)
Month	nly avera	age exte	rnal terr	perature	from Ta	able 8							1	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	e for mea	an interr	al tempe	erature,	Lm,W=	=[(39)m :	r [(93)m	– (96)m	1			1	
(97)m=	1560.47		1394.21	1145.32	866.49	571.67	376.44	394.93	623.8	972.11	1294.35	1543.55		(97)
Space	e heatin	a require	ement fo	r each n	nonth, k	Nh/moni	h = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m		1	
(98)m=	396.93	172.06	64.37	12.08	1.77	0	0	0	0	21.83	, 189.62	444.8		
I								Tota	l per year	(kWh/year) = Sum(9	8)15.912 =	1303.47	(98)
Creek	. haatia	~ ~ ~ ~ ~									, (
Space	e neatin	g require	ement in	kWh/m ²	year								13.47	(99)
8c. Sp	bace co	oling req	luiremer	nt										
Calcu	lated fo		luly and	August.		ble 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I	oss rate	e Lm (ca	Iculated	using 25	5°C inter			and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	917.67	722.42	739.74	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	1	1	1	0	0	0	0		(101)
Us <mark>efu</mark>	l loss, h	mLm (V	/atts) =	(100)m x	: (101)m									
(102) <mark>m=</mark>	0	0	0	0	0	916.32	722.05	739.17	0	0	0	0		(102)
Gains	(solar (gains ca	culated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	2737.85	2644.77	2495.2	0	0	0	0		(103)
						dwelling,	continue	ous (kW	′h) = 0.0	24 x [(10	03)m – (102)m]:	x (41)m	
Ì	,	`	104)m <	: 3 × (98									ı.	
(104)m=	0	0	0	0	0	1311.5	1430.5	1306.48	0	0	0	0		_
										= Sum(=	4048.48	(104)
	I fraction								fC=	cooled	area ÷ (4	4) =	0.73	(105)
		actor (Ta		Í								-	I	
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		-
•					(10.)		((Tota	l = Sum((104)	=	0	(106)
· ·		· ·		month =	· · ·	r <u>`</u>	<u>, , , , , , , , , , , , , , , , , , , </u>	r					l	
(107)m=	0	0	0	0	0	240.83	262.68	239.9	0	0	0	0		-
									Iotal	= Sum(107)	=	743.41	(107)
Space	cooling	requirer	nent in l	«Wh/m²/y	/ear				(107)) ÷ (4) =			7.68	(108)
9b. Ene	ergy rec	luiremer	nts – Col	mmunity	heating	scheme								
								ting prov (Table 1 <i>1</i>			unity sch	neme.	0	(301)
				y/					., 5				Ŭ,	()

Fraction of space heat from community system 1 - (301) =

0	(301)
1	(302)

The community scheme may obtain heat from several sources. The p includes boilers, heat pumps, geothermal and waste heat from power		to four other heat sour	ces; the		
Fraction of heat from Community heat pump			Ļ	1	(303a)
Fraction of total space heat from Community heat pump		(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for		n	Ľ	1	(305)
Distribution loss factor (Table 12c) for community heating	ng system			1.05	(306)
Space heating Annual space heating requirement			Г	kWh/yea 1303.47	r T
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =		1368.65	(307a)
Efficiency of secondary/supplementary heating system i	n % (from Table 4a or App	endix E)		0	(308
Space heating requirement from secondary/supplement	ary system (98) x (301)	x 100 ÷ (308) =		0	(309)
Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =		2314.43 2430.15	 (310a)
Electricity used for heat distribution		307e) + (310a)(310e		37.99	(313)
Cooling System Energy Efficiency Ratio	0.01 × [(0072)(4.77	(314)
Space cooling (if there is a fixed cooling system, if not e		14) =		156	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive inp			Г	235.6	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year	=(330a) + (3	330b) + (330g) =		235.6	(331)
Energy for lighting (calculated in Appendix L)				395.26	(332)
Electricity generated by PVs (Appendix M) (negative qu	antity)		Ē	-259.09	(333)
Electricity generated by wind turbine (Appendix M) (neg	ative quantity)		Γ	0	(334)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission fac kg CO2/kWh		nissions J CO2/year	
CO2 from other sources of space and water heating (no Efficiency of heat source 1 (%) If there is	t CHP) CHP using two fuels repeat (363)	to (366) for the secor	nd fuel	132	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b)	x 0	=	621.62	(367)
Electrical energy for heat distribution	[(313) x	0.52	=	19.72	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	=	641.34	(373)
CO2 associated with space heating (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater or ins	stantaneous heater (312)	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =			641.34	(376)
CO2 associated with space cooling	(315) x	0.52	=	80.96	(377)

CO2 associated with electricity for pur	ips and fans within dw	elling (331)) x		0.52	=	122.28	(378)
CO2 associated with electricity for light	ing	(332))) x		0.52	=	205.14	(379)
Energy saving/generation technologies Item 1	s (333) to (334) as app	licable	C	.52 × 0.	01 =	-134.47	(380)
Total CO2, kg/year	sum of (376)(382) =					915.25	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =					9.46	(384)
El rating (section 14)						91.35	(385)
							_



		User	Details:						
Assessor Name: Software Name:	Stroma FSAP 201		Stroma Softwa	re Ver			Versio	n: 1.0.4.7	
		Property	Address:	6					
Address : 1. Overall dwelling dime	ansions:								
		Δre	ea(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x	r	.85	(2a) =	214.03	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)		(4)] [
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	214.03	(5)
2. Ventilation rate:									
		econdary	other		total			m ³ per hour	
Number of chimneys	heating h	eating +	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」	0	x 2	20 =	0](⁶ 0)
Number of intermittent fa			0		0	x ^	10 =	0	_(<i>02)</i> _(7a)
Number of passive vents					0	× ^	10 =	0](⁷ 5)](7b)
Number of flueless gas fi					-		40 =		
					0			o anges per ho	(7c) ur
Infiltration due to chimne					0		÷ (5) =	0	(8)
Number of storeys in the		a, proceed to (17),	ounerwise c	onunue no	0111 (9) 10 (10)	[0	(9)
Additional infiltration	3(-)					[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	frame or 0.35 fo	or masonr	y constr	uction		İ	0	(11)
••	resent, use the value correspondence of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s	ponding to the grea	ater wall area	a (after					-
deducting areas of openii If suspended wooden f		ed) or 0.1 (sea	ed). else	enter 0				0	(12)
If no draught lobby, en			,,					0	(13)
Percentage of windows		ripped						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	+ (15) =	İ	0	(16)
Air permeability value,	• • •	•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabil	•							0.15	(18)
Air permeability value applie Number of sides sheltere		s been done or a de	egree air pei	meability	is being us	sed	I	0	
Shelter factor	,u		(20) = 1 - [0.075 x (1	9)] =			3 0.78	(19) (20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.12	(21)
Infiltration rate modified f	-	ł					I		
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	

Adjust	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m			-		
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se							
				ondix NL (2	2h) _ (22c	\sim	acuation (I	N5)) , othei	nuine (22h) = (22a)			0.5	(23a)
			0 11		, (, ,	• •	,, -	,) = (23a)			0.5	(23b)
			-	-	-			n Table 4h					73.1	(23c)
,	r	i		I		i	<u> </u>	HR) (24a	, <u> </u>	r í í	· · ·	· · · ·	÷ 100]	
(24a)m=	0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(24a)
b) If	balance	d mech	anical ve	entilation	without	heat rec	covery (N	MV) (24b)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	ntilation of	or positiv	e input v	ventilatio	on from c	outside					
i	if (22b)n	n < 0.5 ×	< (23b), t	then (240	c) = (23b); other\	wise (24	c) = (22t	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
								on from I						
	r ,	· · · ·	r <u>í</u>	r Ì	,	,	<u> </u>	0.5 + [(2	<i>,</i>	<u> </u>	1		1	
(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=	0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(25)
3 He	at losse	s and he	eat loss i	paramete	ər.							_		_
		Gros		Openin		Net Ar	rea	U-valı	le	AXU		k-value	- Α	Xk
		area		m	-	A ,r		W/m2		(W/I	K)	kJ/m²·ł		J/K
Windo	ws					19.95	5 x1	/[1/(1.4)+	0.04] =	26.45				(27)
Walls ⁻	Type1	23.9	94	0		23.94	1 ×	0.16		3.75	Fir			(29)
Walls ⁻	Tvpe2	28.7		0	=	28.78	3 ×	0.18	۲, i	5.18	Fii			(29)
Walls		21.6		19.9		1.71		1.4		2.39	╘┤┟			(29)
					<u> </u>				=				\dashv	
Walls		10.8		0		10.83		0.16	=	1.7				(29)
		elements				85.22								(31)
				effective wi nternal wal			lated using	g formula 1,	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	
		s, W/K :			o una pun			(26)(30)	+ (32) =				39.48	(33)
		Cm = S(•	0)						(30) + (32	(32a)	(32e) -		(34)
			. ,	⁻ = Cm ÷		k l/m2k				tive Value		(020) –	0	=
		•	· ·		,			recisely the				oble 1f	250	(35)
	-	ad of a de			construct	onareno	t known pi	ecisely life	indicative	values of				
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	K						12.78	(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) =			52.26	(37)
Ventila	ation hea	at loss ca	alculated	d monthly	ý				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	19.97	19.76	19.56	18.53	18.33	17.3	17.3	17.1	17.71	18.33	18.74	19.15		(38)
Heat tr	ansfer o	coefficie	nt W/K						(39)m	= (37) + (3	38)m		ı	
(39)m=	72.23	72.02	71.82	70.79	70.59	69.56	69.56	69.36	69.97	70.59	71	71.41		
V 1- 1										Average =			70.74	(39)
										- 3-	(/)			` '

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.96	0.96	0.96	0.94	0.94	0.93	0.93	0.92	0.93	0.94	0.95	0.95		
						<u> </u>	1	ļ	, ,	L Average =	Sum(40)1.	₁₂ /12=	0.94	(40)
Numbe		i	nth (Tab	, 		l .		<u> </u>					1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ting ene	rgy requ	irement:								kWh/y	ear:	
if TF/	A > 13.9	upancy, 9, N = 1 9, N = 1		: [1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0)013 x (TFA -13		36]	(42)
Reduce t	the annua	al average	hot water		5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.33]	(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=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		
Ener <mark>gy c</mark>	ontent of	hot water	used - ca	culated me	onthly $= 4$.	190 x Vd,r	m x nm x L	- 			m(44) ₁₁₂ = ables 1b, 1		1083.95	(44)
(45)m=	147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		
										Total = Su	m(45) ₁₁₂ =	-	1 <mark>4</mark> 21.23	(45)
lf instanta	aneous w	ater heati	ng at point	t of use (no	o hot water	storage),	enter 0 in	boxes (46) to (61)					
(46)m= Water s	22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
	-		includir	ng any se	olar or M	/WHRS	storage	within sa	ame ves	sel		200		(47)
				ank in dw							L			
	-	-			-			ombi boil	ers) ente	er '0' in ((47)			
Water s	•													
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
Tempe	rature f	actor fro	m Table	2b							0	.6		(49)
0,			•	, kWh/ye				(48) x (49)) =		1.	34		(50)
				cylinder								_	1	(54)
		-	ee secti	rom Tabl on 4 3		n/ntre/ua	ay)					0		(51)
		from Ta		011 1.0								0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)
Enerav	lost fro	m water	storage	, kWh/ye	ear			(47) x (51) x (52) x (53) =		0		(54)
		(54) in (5	-	, ,								34		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			1	
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
`´´	r contains	s dedicate	l d solar sto	l orage, (57)	l m = (56)m	x [(50) – ([[H11)] ÷ (5	1 50), else (5	I 7)m = (56)	m where (H11) is fro	m Append	I lix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
Primary	/ circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
-			,			59)m = ((58) ÷ 36	65 × (41)	m				ı	
(mod	lified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	, cylinde	r thermo	ostat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	alculated	for each	n 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	eat rec	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=	212.28	187.52	197.91	178.77	176.17	158.83	153.88	167.01	166.13	185.31	194.24	207.63		(62)	
Solar DI	-IW input	calculated	using App	pendix G o	r Appendix	H (negat	ive quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)			
(add a	dditiona	al lines if	FGHRS	and/or	WWHRS	applies	, see Ap	pendix (G)						
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)	
Output	from v	vater hea	ter												
(64)m=	212.28	187.52	197.91	178.77	176.17	158.83	153.88	167.01	166.13	185.31	194.24	207.63		_	
								Out	out from w	ater heate	r (annual)₁	12	2185.68	(64)	
Heat g	ains fro	om water	heating	, kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]		
(65)m=	100.94	89.77	96.16	88.82	88.93	82.19	81.52	85.88	84.61	91.97	93.96	99.39		(65)	
inclu	ide (57)m in calo	culation	of (65)m	only if c	ylinder	is in the a	dwelling	or hot w	vater is fi	rom com	munity h	leating		
5. In	ternal g	ains (see	Table	5 and 5a):										
Metab	olic dai	ns (Table	. 5). Wa	tts											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(66)m=	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	11 <mark>8.17</mark>	118.17	118.17		(66)	
Lightin	g gains	(calcula	ted in A	ppendix	L, equati	ion L9 c	r L9a), a	lso see	Table 5						
(67)m=	18.62	16.54	13.45	10.18	7.61	6.43	6.94	9.03	12.12	15.38	17.96	19.14		(67)	
Applia	nces da	ains (calc	ulated i	n Appene	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5					
(68)m=	208.9	211.06	205.6	193.97	179.29	165.5	156.28	154.11	159.57	171.2	185.88	199.68		(68)	
		s (calcula					L	also se							
(69)m=	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82		(69)	
		ins gains									I				
(70)m=					0	0	0	0	0	0	0	0		(70)	
		vaporatio	n (neas	l ative valu	L es) (Tab		_				-				
	-94.53		· •	-	, , 1	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	l	(71)	
		gains (T		0.000		0.100	0.000	0 1100	0 1100	0.100		0 1100			
(72)m=	135.67	<u>, , , , , , , , , , , , , , , , , , , </u>	129.25	123.36	119.53	114.15	109.57	115.43	117.52	123.61	130.5	133.59	l	(72)	
				120.00	110.00)m + (67)m							(/	
(73)m=	421.64	I gains = 419.63	406.75	385.96	364.89	344.52	331.24	337.02	347.66	368.65	392.79	410.86	l	(73)	
. ,	lar gain		400.75	303.90	304.09	344.32	331.24	337.02	347.00	300.03	392.19	410.00		(10)	
		calculated	usina sola	ar flux from	Table 6a a	and asso	ciated equa	tions to co	onvert to th	ne applicat	ole orientat	ion.			
-		Access F	-	Area		Flu			g_		FF		Gains		
		Table 6d		m²			ble 6a	Т	able 6b	Т	able 6c		(W)	a)m + (61)m (62) (63) (63) (64) (65) (66) (66) (67) (68) (69) (70) (71) (72) (72) (73)	
North	0.9x	0.77	×	19.	.95	x	10.63	x	0.63	ר × ר	1		92.62	(74)	
North	0.9x	0.77	×				20.32		0.63	╡╷╞	1			J	
North	0.9x	0.77	x				34.53		0.63		1]	
North	0.9x	0.77	x		.95		55.46		0.63		1]	
North	0.9x	0.77	x		.95		74.72		0.63		1]	
NOTUT	0.9X	0.77	X	19.	.95	x	74.72	×	0.63	×	1	=	650.77	(74)	

	North $0.9x$ 0.77 x 19.95 x 79.99 x 0.63 x 1 = 696.67 (74)														
North	0.9x	0.77	X	19.	95	x	7	9.99	×	0.63	×	1	=	696.67	(74)
North	0.9x	0.77	x	19.	95	x	7	4.68	x	0.63	x	1	=	650.43	(74)
North	0.9x	0.77	x	19.	95	x	5	9.25	×	0.63	x	1	=	516.03	(74)
North	0.9x	0.77	x	19.	95	x	4	1.52	× [0.63	×	1	=	361.61	(74)
North	0.9x	0.77	x	19.	95	x	2	4.19	×	0.63	×	1	=	210.69	(74)
North	0.9x	0.77	x	19.	95	x	1	3.12	x	0.63	x	1	=	114.25	(74)
North	0.9x	0.77	x	19.	95	x	ε	3.86	× [0.63	×	1	=	77.21	(74)
Solar g	ains in	watts, ca	lculated	for eac	h month				(83)m =	= Sum(74)m .	(82)m	-	-		
(83)m=	92.62	176.99	300.76	483.09	650.77	69	96.67	650.43	516.0	3 361.61	210.69	114.25	77.21		(83)
Total g	ains – ii	nternal a	nd solar	⁻ (84)m =	= (73)m	+ (8	33)m ,	, watts							
(84)m=	514.25	596.63	707.51	869.06	1015.66	10	41.19	981.67	853.0	6 709.26	579.34	507.04	488.07		(84)
7. Me	an inter	nal temp	erature	(heating	season)									
Temp	erature	during he	eating p	eriods ir	n the livi	ng	area f	rom Tab	ole 9, [·]	Th1 (°C)				21	(85)
Utilisa	ation fac	tor for ga	ains for I	living are	ea, h1,m	n (se	ee Ta	ble 9a)							
	Jan	Feb	Mar	Apr	May		Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.96	0.85	0.63	(0.43	0.31	0.37	0.66	0.94	0.99	1		(86)
Mean	interna	l tempera	ature in	living ar	ea T1 (fo	ollo	w stei	os 3 to 7	in Ta	ble 9c)					
(87)m=	20.1	20.26	20.53	20.85	20.98		21	21	21	20.98	20.75	20.37	20.07		(87)
Tomp	oroturo	during b	ooting p	oriodo ir	root of	du	olling	from To		Th2 (°C)					
(88)m=	20.12	20.12	20.12	20.13	20.13	-	0.15	20.15	20.1		20.13	20.13	20.12		(88)
						1				20.14	20.10	20.10	20.12		()
		tor for ga				T -	<u> </u>		, 		0.04	0.00		1	(80)
(89)m=	89)m= 0.99 0.99 0.95 0.81 0.58 0.37 0.25 0.3 0.58 0.91 0.99 1 (89)														
Mean															
(90)m=															
	$fLA = Living area \div (4) = 0.47 $ (91)														
Mean	interna	l tempera	ature (fo	r the wh	ole dwe	llin	g) = fL	_A × T1	+ (1 –	fLA) × T2					
(92)m=	19.48	19.68	20.01	20.38	20.52	2	0.55	20.55	20.5	5 20.53	20.28	19.82	19.45		(92)
Apply	adjustn	nent to th	ne mean	internal	temper	atu	re fro	m Table	4e, w	here appro	opriate			-	
(93)m=	19.48	19.68	20.01	20.38	20.52	2	0.55	20.55	20.5	5 20.53	20.28	19.82	19.45		(93)
		ting requ													
				•		ned	at ste	ep 11 of	Table	9b, so tha	t Ti,m=	(76)m an	d re-calo	culate	
	Jan	factor fo Feb	Mar	Apr	May	Г	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
 Utilisa		tor for ga		•	iviay		Jun	Jui		g Sep	001	NOV	Dec		
(94)m=	0.99	0.98	0.95	0.83	0.6	Γ	0.4	0.28	0.34	0.62	0.92	0.99	1		(94)
	I gains,	hmGm,	W = (94	1)m x (84	1 4)m	I								I	
(95)m=	510.88	587.47	673.31	717.19	609	4	12.82	274.69	287.6	3 438.55	530.68	499.5	485.63		(95)
Month	nly avera	age exter	rnal tem	perature	from T	abl	e 8					4		ı	
(96)m=	4.3	4.9	6.5	8.9	11.7	ſ	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	loss rate	e for mea	ın intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93))m– (96)m]				
(97)m=	1096.39	1064.51	970.48	812.89	622.74	4	13.8	274.78	287.9	449.89	683.33	902.98	1088.98		(97)
						· • • -	1	L 0.00	х л Г //	(0E)	\1 (.	(d)			
Space	e heatin 435.62	g require 320.57	ment fo 221.09	r each n 68.91	10.22	Wh	/mont 0	n = 0.02	24 X [()	97)m – (95)mj x (4 113.57	290.5	448.89	1	

								Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	1909.37	(98)
Spac	e heatir	ng require	ement in	۱ kWh/m²	/year								25.42	(99)
8c. S	pace co	oling rec	quiremer	nt										
Calcu	lated fo	o <mark>r June, .</mark>	July and	August.	See Tal	ple 10b		r				[
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		e Lm (ca	1	T T		· · · ·	i	i		· ·			1	
(100)m=		0	0	0	0	653.87	514.75	527.1	0	0	0	0		(100)
	r	ctor for lo	i										ı	
(101)m=		0	0	0	0	0.99	1	0.99	0	0	0	0		(101)
		hmLm (V	1	ì	r`´´		1	1	1				I	(100)
(102)m=		0	0	0	0	648.35	513.06	523.29	0	0	0	0		(102)
	<u> </u>	gains ca	1	<u> </u>		r	<u> </u>	r	, í			-	I	(4.00)
(103)m=		0	0	0	0	1290.32	-		0	0	0	0		(103)
		ng <i>require</i> 5 zero if (lwelling,	continuo	ous (kN	(h) = 0.0	24 x [(10	03)m – (102)m] :	< (41)m	
(104)m=					0	462.22	525.4	406.74	0	0	0	0		
(Ů	l °			Ĵ		0_011		-	= Sum(=	1394.36	(104)
Cooled	d fractio	n									area ÷ (4		0.91	(101)
		factor (Ta	able 10b)								- /		
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
			<u> </u>			-		7 -	Tota	= Sum	(104)	=	0	(106)
Spa <mark>ce</mark>	cooling	g requir <mark>e</mark> r	<mark>men</mark> t for	month =	(104)m	× (105)	× (106)r	n					<u> </u>	
(107) <mark>m=</mark>	0	0	0	0	0	105.71	1 <mark>2</mark> 0.16	93.02	0	0	0	0		
									Total	= Sum((107)	=	318.88	(107)
Space	cooling	require	ment in I	kWh/m²/y	/ear				(107)	$(+) \div (+) =$			4.25	(108)
		quiremer				scheme			, ,	()]
		ed for sp						ting prov	rided by	a comm	unity sch	neme.		
		ace heat									,		0	(301)
Fractic	on of sp	ace heat	from co	mmunity	v system	1 – (30 ⁻	1) =						1	(302)
	-	cheme ma		-	-			allows for	CHP and i	un to four	other heat	sources: t	he latter	
		heat pump	-								ound nout	0001000, 1		
Fractic	on of he	at from C	Commun	ity heat	pump								1	(303a)
Fractic	on of tot	al space	heat fro	m Comr	nunity he	eat pum	C			(3	02) x (303	a) =	1	(304a)
		trol and			-			unity hea	ating sys				1	(305)
		ss factor	0.0		·	())			5,				1.05	(306)
	heatin		,	,		,	5,						kWh/yea	
-		heating	requiren	nent									1909.37	7
Space	heat fro	om Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	=	2004.84	(307a)
Efficie	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	g require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Wator	heatin	a					-							1
		y heating ı	requirem	nent									2185.68	

If DHW from community scheme:

Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2294.97	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] =	43	(313)
Cooling System Energy Efficiency Ratio		4.77	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	66.91	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	outside	204.72	(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) =	204.72	(331)
Energy for lighting (calculated in Appendix L)		328.89	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-207.27	(333)
Electricity generated by wind turbine (Appendix M) (negative qu	antity)	0	(334)
12b. CO2 Emissions – Community heating scheme			_
	Energy Emission factor		
	kWh/year kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%)	g two fu <mark>els repeat (363)</mark> to (366) for the second <mark>fu</mark> e	I 132	(367a)
CO2 associated with heat source 1 [(307b)+	(310b)] x 100 ÷ (367b) x 0 =	703.6	(367)
Electrical energy for heat distribution	[(313) x 0.52 =	22.32	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372) =	725.92	(373)
CO2 associated with space heating (secondary)	(309) x 0 =	0	(374)
CO2 associated with water from immersion heater or instantane	eous heater (312) x 0.22 =	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =	725.92	(376)
CO2 associated with space cooling	(315) x 0.52 =	34.73	(377)
CO2 associated with electricity for pumps and fans within dwelli	ng (331)) x 0.52 =	106.25	(378)
CO2 associated with electricity for lighting	(332))) x 0.52 =	170.7	(379)
Energy saving/generation technologies (333) to (334) as applicated term 1	0.52 × 0.01 =	-107.57	(380)
Total CO2, kg/year sum of (376)(382) =		930.02	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =		12.38	(384)
El rating (section 14)		89.62	(385)

		Us	er Details:						
Assessor Name: Software Name:	Stroma FSAP 2012	2	Stroma Softwa				Versio	n: 1.0.4.7	
		Prope	erty Address:	9					
Address :									
1. Overall dwelling dime	nsions:								
			Area(m ²)		Av. Hei	ght(m)		Volume(m ³	<u>,</u>
Ground floor		L	134.6	(1a) x	2.	85	(2a) =	383.61	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e))+(1n)	134.6	(4)					
Dwelling volume				(3a)+(3b)	+(3c)+(3d))+(3e)+	.(3n) =	383.61	(5)
2. Ventilation rate:									
		condary eating	other		total			m ³ per hou	r
Number of chimneys			+ 0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0 +	+ 0	1 = Г	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			, <u> </u>	0	x ^	10 =	0	(7a)
Number of passive vents				Ē	0	x ^	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
				_			Air ch	anges per ho	our
Infiltration due to chimne					0		÷ (5) =	0	(8)
If a pressurisation test has b		d, proceed to ((17), otherwise c	ontinue fro	om (9) to (16)			–
Number of storeys in the Additional infiltration	ne dwelling (ns)					[(0).	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0	25 for steel or timber f	rame or 0.3	5 for masonr	v constr	uction	[(9)	-1jx0.1 =	0	(10)
if both types of wall are p	resent, use the value corresp			•	aotion		l	0	
deducting areas of openir If suspended wooden f		od) or 0 1 (a	socied) else	ontor O			1		
If no draught lobby, en		eu) or 0. r (s	sealeu), eise					0	(12) (13)
Percentage of windows		inned						0	(14)
Window infiltration		ipped	0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) +	· (15) =		0	(16)
Air permeability value,	q50, expressed in cubi	c metres pe	er hour per so	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(17	7) ÷ 20]+(8), ot	herwise (18) = (16)				0.15	(18)
Air permeability value applie	s if a pressurisation test has	been done or	a degree air per	meability i	is being us	ed			
Number of sides sheltere	d							2	(19)
Shelter factor			(20) = 1 - [9)] =			0.85	(20)
Infiltration rate incorporat	•		(21) = (18)	x (20) =				0.13	(21)
Infiltration rate modified f		1			-				
Jan Feb	Mar Apr May	Jun J	lul 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 $(22a)m = (22a)m$	2)m ÷ 4								
	1.23 1.1 1.08	0.95 0.	95 0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rate	e (allowir	ng for sh	nelter an	d wind s	peed) =	: (21a) x (22a)m						
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15			
Calculate effect			ate for t	he appli	cable ca	se								
If exhaust air he			ndix N (2	3h) - (23a	a) x Fmv (e	auation (N5)) other	wise (23h) - (23a)				0.5	(23a)
If balanced with) = (20u)				0.5	(23b)
a) If balance		-	-	-					2h)m + ('	23h) v [1 _ (23c)		2.25	(23c)
(24a)m= 0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29	- 100j		(24a)
b) If balance	d mecha	anical ve	ntilation	without	heat rec	coverv (I <u>I</u> MV) (24b)	m = (22	2b)m + (2	L 23b)				
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0			(24b)
c) If whole ho	use ext	tract ven	tilation of	or positiv	/e input \	ventilati	on from o	utside			Į			
•				•	•		c) = (22b)		.5 × (23b)				
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0			(24c)
d) If natural v if (22b)m				•	•		on from lo 0.5 + [(22		0.5]					
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0			(24d)
Effective air of	change	rate - en	ter (24a) or (24b	o) or (240	c) or (24	ld) in box	(25)						
(25)m= 0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29			(25)
3. Heat losses	and he	at loss p	aramete	er:										
3. Heat losses	and he Gros area	s	oaramete Openin m	gs	Net Are A ,n		U-valu W/m2ł		A X U (W/ł	<)	k-value kJ/m²·ł		A X kJ/l	
	Gros area	s	Openin	gs		n²		<		<)				
ELEMENT	Gros area 1	s	Openin	gs	A ,n	n² x1	W/m2ł	(0.04] =	(VV/ł	<)				K
ELEMENT Windows Type	Gros area 1 2	s	Openin	gs	A ,n	m ² x1	W/m2ł /[1/(1.2)+ ((0.04] = 0.04] =	(W/ł 5.87	<)				K (27)
ELEMENT Windows Type Windows Type	Gros area 1 2 3	s	Openin	gs	A ,n 5.13 4.85	m ² ×1	W/m2ł /[1/(1.2)+ (/[1/(1.2)+ (().04] = ().04] = ().04] =	(W/ł 5.87 5.55	<)				K (27) (27)
ELEMENT Windows Type Windows Type Windows Type	Gros area 1 2 3 4	s	Openin	gs	A ,n 5.13 4.85 16.25	n ² x ¹	W/m2k /[1/(1.2)+0 /[1/(1.2)+0 /[1/(1.2)+0	 ().04] = ().04] = ().04] = ().04] =	(VV/ł 5.87 5.55 18.61					K (27) (27) (27)
ELEMENT Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 3 4	:S (m²)	Openin	gs ,2	A ,n 5.13 4.85 16.25 4.28	n ² x ¹	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(().04] = ().04] = ().04] = ().04] =	(W/ł 5.87 5.55 18.61 4.9					K (27) (27) (27) (27)
ELEMENT Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 3 4 5	55 (m²)	Openin m	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52	n ² x ¹	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(<pre>\$ 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =</pre>	(W/ł 5.87 5.55 18.61 4.9 23.5					K (27) (27) (27) (27) (27)
ELEMENT Windows Type Windows Type Windows Type Windows Type Windows Type Walls Type1	Gros area 1 2 3 4 5 5	5 (m ²)	Openin m	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39	m ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(0.18	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 5.87 5.55 18.61 4.9 23.5 4.75					K (27) (27) (27) (27) (27) (27) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2	Gros area 1 2 3 4 5 5 41.5 21.4	5 (m ²)	Openin m 15.1 ⁻ 0	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39 21.4	n ² x ¹ x ¹	W/m2k /[1/(1.2)+ (/[1/(1.2)+ (/[1/(1.2)+ (/[1/(1.2)+ (/[1/(1.2)+ (0.18 0.16	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 5.87 5.55 18.61 4.9 23.5 4.75 3.36					K (27) (27) (27) (27) (27) (27) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3	Gros area 1 2 3 4 5 5 41.5 21.4 16.1	55 (m ²)	Openin m 15.1 ⁻ 20.5:	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39 21.4 -4.43	n ² x ¹ x ¹	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(0.18 0.16 1.4	<pre> ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04] = ().04]</pre>	(W/k 5.87 5.55 18.61 4.9 23.5 4.75 3.36 -6.2					K (27) (27) (27) (27) (27) (27) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4	Gros area 1 2 3 4 5 5 21.4 16.1 22.2	5 (m ²)	Openin m 15.1 ⁻ 20.5; 20.5;	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39 21.4 -4.43 1.68	n ² x ¹ x ¹	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(0.18 0.16 1.4 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 5.87 5.55 18.61 4.9 23.5 4.75 3.36 -6.2 2.35					K (27) (27) (27) (27) (27) (27) (29) (29) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5	Gros area 1 2 3 4 5 5 21.4 16.1 22.2 14.8	5 (m ²)	Openin m 15.1 0 20.5 20.5 20.5	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39 21.4 -4.43 1.68 14.82	n ² x ¹	W/m2k /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(0.18 0.16 1.4 1.4 0.16	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 =	(W/k 5.87 5.55 18.61 4.9 23.5 4.75 3.36 -6.2 2.35 2.32					K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type5 Walls Type5	Gros area 1 2 3 4 5 4 15. 21.4 16.1 22.2 14.8 14.8 15.4	5 (m ²)	Openin m 15.1 ⁻ 20.5 ² 20.5 ² 0 0	gs ,2	A ,n 5.13 4.85 16.25 4.28 20.52 26.39 21.4 -4.43 1.68 14.82 4.2	n ² x ¹	W/m2h /[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(/[1/(1.2)+(0.18 0.16 1.4 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W/k 5.87 5.55 18.61 4.9 23.5 4.75 3.36 -6.2 2.35 2.32 5.88					K (27) (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	98.33	(33)
Heat capacity $Cm = S(A \times k)$	((28)(30) + (32) + (32a)(32e) =	0	(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 can be used instead of a detailed calculation.	precisely the indicative values of TMP in Table 1f		_

Thermal bridges : S (L x Y) calculated using Appendix K

			are not kn	own (36) =	= 0.15 x (3	1)			(22)	(26)				
	abric he			1						(36) =	05) (5)		118.67	(37)
ventila			alculated		í –				r	= 0.33 × (_	1	
(28)m-	Jan 38.14	Feb 37.74	Mar 37.34	Apr 35.32	May 34.92	Jun 32.9	Jul 32.9	Aug 32.49	Sep 33.7	Oct 34.92	Nov 35.72	Dec 36.53		(38)
(38)m=				30.32	54.92	32.9	32.9	32.49				30.33		(00)
			·	450.00	450.50	454 57	454 57	454.40	1	= (37) + (3		455.0	1	
(39)m=	156.81	156.41	156.01	153.99	153.59	151.57	151.57	151.16	152.37	153.59	154.39	155.2	152.00	(39)
Heat lo	oss para	meter (H	HLP), W	/m²K						Average = = (39)m ÷		12 / 1 Z=	153.89	(39)
(40)m=	1.17	1.16	1.16	1.14	1.14	1.13	1.13	1.12	1.13	1.14	1.15	1.15		
Numbe	er of day	/s in mo	nth (Tab	le 1a)			-			Average =	Sum(40)₁.	₁₂ /12=	1.14	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
													I	
4. Wa	ater hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
Accum		IDODOV (NI										1	(40)
		upancy, 9, N = 1		[1 - exp	(-0.0003	349 x (TF)2)] + 0.0	0013 x (⁻	TFA -13.		91		(42)
	A £ 13.					,			,		,			
					es per da							3.22		(43)
		-			5% if the c /ater use, l	-	-	to achieve	a water us	se target o				
								A 117	San	Oct	Nov	Dee	1	
Hot wate	Jan er usage i	Feb n litres per	Mar day for ea	Apr ach month	May Vd,m = fa	Jun ctor from	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	105.28	109.41	113.54	1	
(44)11=	113.34	109.41	103.20	101.15	97.02	92.9	92.9	97.02		Total = Su			1238.61	(44)
Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,i	m x nm x E	OTm / 3600					1230.01	(++)
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
										Total = Su	m(45) ₁₁₂ =	=	1624.02	(45)
If instan	taneous w	/ater heatil	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m= Water	25.26 storage	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	-		includir	na anv se	olar or W	/WHRS	storage	within sa	ame ves	sel		200	1	(47)
-		. ,		• •	velling, e		-					200]	()
	•	-			ncludes i			• •	ers) ente	er '0' in (47)			
	storage			,					,	,	,			
a) If m	nanufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
Tempe	erature f	actor fro	m Table	2b							0	.6		(49)
Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(48) x (49) =		1.	34		(50)
				•	loss fact								1	
		-			le 2 (kW	h/litre/da	ay)					0		(51)
	-	leating s	ee secti ble 2a	on 4.3								0	1	(50)
			m Table	2b								0		(52) (53)
-			storage		oor			(47) v (51) x (52) x (53) -]	
•••		(54) in (5	-	,	Jui			(JT) A (JT	, ~ (02) ^ (0 34		(54) (55)

(st)m- 11.86 37.63 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 40.32 41.68 <t< th=""><th></th><th>age loss ca</th><th>lculated</th><th>for each</th><th>month</th><th></th><th></th><th>((56)m = (</th><th>55) × (41)</th><th>m</th><th></th><th></th><th></th><th></th></t<>		age loss ca	lculated	for each	month			((56)m = (55) × (41)	m				
(67)m= 41.65 37.63 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 40.32 41.66 <	(56)m= 41	.66 37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet Internet	If cylinder co	ntains dedicate	ed 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	
Primary circuit loss calculated for each month (59)m = (58) + 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat) (99)m 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) (59) Combit loss calculated for each month (61)m = (60) + 365 × (41)m (61) (61) (61) (62) (63) (62) (62) (63) (62) (62) (63) (62) (62) (63) (64) (61) (62) (63) (64) (62) (64) (62) (64) (62) (63) (64) (62) (64) (64) (65) (62) (64) (62) (64) (64) (65) (64) (62) (64) (64) (64) (64) (64) (64) (64) (64) (64) (64) (64)	(57)m= 41	.66 37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66]	(57)
Primary circuit loss calculated for each month (59)m = (58) + 365 x (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat) (s)m= 23.28 21.01 23.28 22.51 23.28 22.51 23.28 22.51 23.28 22.51 23.28 (59) Combi loss calculated for each month (61)m = (60) + 365 x (41)m (61)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Primary ci	rcuit loss (a	nnual) fro	om Table	e 3							0]	(58)
(59)m 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) 23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (25.1) (23.26 (27.9) (26.2) (26.2) (26.2) (26.2) (26.2) (27.9) (27.9) (26.2) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (28.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) (27.9) </td <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>59)m = (</td> <td>(58) ÷ 36</td> <td>65 × (41)</td> <td>m</td> <td></td> <td></td> <td></td> <td></td> <td></td>	-					59)m = ((58) ÷ 36	65 × (41)	m					
Combi loss calculated for each month (61)m = (60) + 365 x (41)m (61)m ((1)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td>(modifie</td> <td>d by factor</td> <td>from Tab</td> <td>le H5 if t</td> <td>here is s</td> <td>solar wat</td> <td>ter heatii</td> <td>ng and a</td> <td>cylinde</td> <td>r thermo</td> <td>stat)</td> <td></td> <td></td> <td></td>	(modifie	d by factor	from Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(f1)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td>(59)m= 23</td> <td>.26 21.01</td> <td>23.26</td> <td>22.51</td> <td>23.26</td> <td>22.51</td> <td>23.26</td> <td>23.26</td> <td>22.51</td> <td>23.26</td> <td>22.51</td> <td>23.26</td> <td>]</td> <td>(59)</td>	(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)
Total heat required for water heating calculated for each month (62)m = 0.85 x (45)m + (46)m + (57)m + (59)m + (61)m (62) Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add dditional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add dditional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) (63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Combi los	s calculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m				_	_	
(62)me 233.3 205.91 216.89 195.32 192.05 172.53 166.56 181.57 180.87 202.49 212.99 227.99 (62) Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter 0' if no solar contribution to water heating) (ad additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) (63)me 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(61)m=	0 0	0	0	0	0	0	0	0	0	0	0		(61)
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) (isi)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total heat	required fo	r water h	eating ca	alculated	l for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(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 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td>(62)m= 23</td> <td>3.3 205.91</td> <td>216.89</td> <td>195.32</td> <td>192.05</td> <td>172.53</td> <td>166.58</td> <td>181.57</td> <td>180.87</td> <td>202.49</td> <td>212.99</td> <td>227.99</td> <td></td> <td>(62)</td>	(62)m= 23	3.3 205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		(62)
(63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </td <td>Solar DHW in</td> <td>nput calculated</td> <td>d using App</td> <td>endix G or</td> <td>Appendix</td> <td>H (negati</td> <td>ve quantity</td> <td>/) (enter '0</td> <td>' if no sola</td> <td>r contribut</td> <td>ion to wate</td> <td>er heating)</td> <td></td> <td></td>	Solar DHW in	nput calculated	d using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
Could from water heater Could from water heater Could from water heater (64)m= 233.3 205.91 216.89 195.32 192.05 172.53 166.58 181.57 180.87 202.49 212.99 227.99 Output from water heater Cuuput from water heater (annual) 2388.47 (64) Heat gains from water heating, kWh/month 0.25 [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65) (65)m= 107.93 95.88 102.47 94.32 94.21 86.74 85.74 90.73 89.51 97.68 100.19 106.16 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating (66) (66) 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 (66) Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m 27.03 24.01 19.52 20.22 240.19 22.82 22.37 23.6 27.78 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68) (69)m= 37.53 37.53 37.53	(add addit	ional lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)					
(64)m= 233.3 205.91 216.89 195.32 192.05 172.53 166.58 181.57 180.87 202.49 212.99 227.99 Output from water heating, kWh/month 0,25 10.85 × (45)m + (61)m] + 0.8 × [(46)m + (57)m + (59)m] (64) Heat gains from water heating, kWh/month 0,25 10.85 × (45)m + (61)m] + 0.8 × [(46)m + (57)m + (59)m] (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating (65) 5. Internal gains (see Table 5 and 5a): Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 <	(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water heater (annua)s 2388.47 (64) Heat gains from water heating, kWh/month 0.25 [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65)m INTERNATION OF COLSPAN AND AND AND AND AND AND AND AND AND A	Output fro	m water hea	ater									2		
Heat gains from water heating. kWh/month 0.25 $[0.85 \times (45)n + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (65)m 107.93 95.88 102.47 94.32 94.21 86.74 85.74 90.73 89.51 97.68 100.19 106.16 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	(64)m= 23	3.3 205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		
(65)m = 107.93 95.88 102.47 94.21 86.74 85.74 90.73 89.51 97.68 100.19 106.16 (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 = 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Outp</td> <td>out from wa</td> <td>ater heate</td> <td>r (annual)₁</td> <td>12</td> <td>2388.47</td> <td>(64)</td>								Outp	out from wa	ater heate	r (annual)₁	12	2388.47	(64)
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 <u>Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec</u> (66)m = 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 1	Hea <mark>t gain</mark> s	s from wate	r heating	, kWh/m	onth 0.2	<mark>5 ´</mark> [0.85	× (45)m	ı + (61)n	n] + 0.8 x	(<mark>46)m</mark>	+ (57)m	+ (59)m	1	
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= 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3	(65)m= 10	7.93 95.88	102.47	94.32	94.21	<mark>8</mark> 6.74	85.74	90.73	89.51	9 <mark>7.68</mark>	100.19	106.16		(65)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 145.3 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>														
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	include	(57)m in ca	lculation	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	<mark>mu</mark> nity h	l neating	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$. ,				ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 27.03 24.01 19.52 14.78 11.05 9.33 10.08 13.1 17.58 22.33 26.06 27.78 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 303.18 306.33 298.4 281.52 260.22 240.19 226.82 223.67 231.6 248.48 269.78 289.81 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53	5. Intern	al gains (se	e Table {	5 and 5a		ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
$\begin{array}{c} (67) \\ \hline (67)m = & \hline 27.03 & 24.01 & 19.52 & 14.78 & 11.05 & 9.33 & 10.08 & 13.1 & 17.58 & 22.33 & 26.06 & 27.78 \\ \hline (67)m = & \hline 27.03 & 24.01 & 19.52 & 14.78 & 11.05 & 9.33 & 10.08 & 13.1 & 17.58 & 22.33 & 26.06 & 27.78 \\ \hline (67)m = & \hline 27.03 & 24.01 & 19.52 & 14.78 & 11.05 & 9.33 & 10.08 & 13.1 & 17.58 & 22.33 & 26.06 & 27.78 \\ \hline (68)m = & \hline 303.18 & 306.33 & 298.4 & 281.52 & 260.22 & 240.19 & 226.82 & 223.67 & 231.6 & 248.48 & 269.78 & 289.81 \\ \hline (68)m = & \hline 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 $	5. Interna Metabolic	al gains (se gains (Tabl	e Table { e 5), Wat	5 and 5a):								neating	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 303.18 306.33 298.4 281.52 260.22 240.19 226.82 223.67 231.6 248.48 269.78 289.81 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53	5. Intern Metabolic	al gains (se gains (Tabl an Feb	e Table { e 5), Wat Mar	5 and 5a ts Apr): May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	neating	(66)
$\begin{array}{c} (68)_{m} = & 303.18 & 306.33 & 298.4 & 281.52 & 260.22 & 240.19 & 226.82 & 223.67 & 231.6 & 248.48 & 269.78 & 289.81 \\ \hline \\ (68)_{m} = & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 &$	5. Interna Metabolic (66)m= 14	al gains (se gains (Tabl an Feb 5.3 145.3	e Table (e 5), Wat Mar 145.3	5 and 5a ts Apr 145.3): May 145.3	Jun 145.3	Jul 145.3	Aug 145.3	Sep 145.3	Oct	Nov	Dec	a ating	(66)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 37.53 $37.$	5. Interna Metabolic J (66)m= 14 Lighting ga	al gains (se gains (Tabl an Feb 5.3 145.3 ains (calcula	e Table (e 5), Wat Mar 145.3 ated in Aj	5 and 5a ts Apr 145.3 opendix): May 145.3 L, equati	Jun 145.3 ion L9 of	Jul 145.3 r L9a), a	Aug 145.3 Iso see	Sep 145.3 Table 5	Oct 145.3	Nov 145.3	Dec 145.3	neating	
$ \begin{array}{c} (69)m = & \hline 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37.53 & 37$	5. Interna Metabolic (66)m= 14 Lighting ga (67)m= 27	al gains (se gains (Tabl an Feb 5.3 145.3 ains (calcula .03 24.01	e Table (e 5), Wat Mar 145.3 ated in A 19.52	Apr 145.3 14.78): 145.3 L, equati 11.05	Jun 145.3 ion L9 o 9.33	Jul 145.3 r L9a), a 10.08	Aug 145.3 Iso see 13.1	Sep 145.3 Table 5 17.58	Oct 145.3 22.33	Nov 145.3	Dec 145.3	neating	
Pumps and fans gains (Table 5a) $(70)m=$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </td <td>5. 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231.6 23</td> <td>Oct 145.3 22.33 ble 5 248.48 5 37.53 0 -116.24</td> <td>Nov 145.3 26.06 269.78 37.53 0 -116.24</td> <td>Dec 145.3 27.78 289.81 37.53 0 -116.24</td> <td>heating</td> <td> (67) (68) (69) (70) (71) </td>	e Table { Mar 145.3 ated in A 19.52 culated ir 298.4 ated in A 37.53 s (Table 5 0 on (nega -116.24	and 5a ts Apr 145.3 opendix 14.78 14.78 Appendix 281.52 ppendix 37.53 5a) 0 tive valu -116.24): 145.3 L, equati 11.05 dix L, equati 260.22 L, equati 37.53 0 es) (Tab -116.24	Jun 145.3 ion L9 o 9.33 uation L 240.19 ion L15 37.53 0 le 5) -116.24	Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 0 -116.24	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 0 -116.24	Sep 145.3 Table 5 17.58 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 23	Oct 145.3 22.33 ble 5 248.48 5 37.53 0 -116.24	Nov 145.3 26.06 269.78 37.53 0 -116.24	Dec 145.3 27.78 289.81 37.53 0 -116.24	heating	 (67) (68) (69) (70) (71)
	5. International constraints of the second state of the second st	al gains (Segains (Tables) gains (Tables) an Feb 5.3 145.3 ains (calculation) 24.01 s gains (calculation) 306.33 ains (calculation) 306.33 ains (calculation) 306.33 ains (calculation) 37.53 d fans gains 0 0 0 g. evaporati 6.24 6.24 -116.24 tting gains (5.06	e Table { Mar 145.3 ated in A 19.52 culated in 298.4 ated in A 37.53 s (Table § 0 on (nega -116.24 Table 5) 137.73	and 5a ts Apr 145.3 opendix 14.78 14.78 Appendix 281.52 ppendix 37.53 5a) 0 tive valu -116.24): 145.3 L, equati 11.05 dix L, equati 260.22 L, equati 37.53 0 es) (Tab -116.24	Jun 145.3 ion L9 of 9.33 uation L 240.19 ion L15 37.53 0 le 5) -116.24 120.47	Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 0 -116.24 115.24	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 0 -116.24 121.94	Sep 145.3 Table 5 17.58 5 see Ta 231.6 5 Table 37.53 0 -116.24 124.32	Oct 145.3 22.33 ble 5 248.48 5 37.53 0 -116.24 131.29	Nov 145.3 26.06 269.78 37.53 0 -116.24 139.16	Dec 145.3 27.78 289.81 37.53 0 -116.24 142.69	heating	 (67) (68) (69) (70) (71)
6. Solar gains:	5. International control of the second state	al gains (Tabl gains (Tabl an Feb 5.3 145.3 ains (calcula 0.03 24.01 s gains (calcula 3.18 306.33 ains (calcula 5.3 37.53 d fans gains 0 0 g. evaporati 6.24 -116.24 tting gains (5.06 142.68 rnal gains (e Table { Mar 145.3 ated in Ap 19.52 culated in A 298.4 ated in A 37.53 s (Table \$ 0 on (nega -116.24 Table 5) 137.73	and 5a Apr 145.3 opendix 14.78 Appendix 281.52 opendix 37.53 5a) 0 tive valu -116.24): 145.3 L, equati 11.05 dix L, eq 260.22 L, equat 37.53 0 es) (Tab -116.24 126.63	Jun 145.3 ion L9 of 9.33 uation L 240.19 ion L15 37.53 0 le 5) -116.24 120.47 (66)	Jul 145.3 r L9a), a 10.08 13 or L1 226.82 or L15a) 37.53 0 -116.24 115.24 m + (67)m	Aug 145.3 Iso see 13.1 3a), also 223.67), also se 37.53 0 -116.24 121.94 + (68)m -	Sep 145.3 Table 5 17.58 5 see Ta 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 231.6 24 231.6 24 231.6 24 231.6 24 24 24 24 24 24 24 24 24 24	Oct 145.3 22.33 ble 5 248.48 5 37.53 0 -116.24 131.29 (70)m + (7	Nov 145.3 26.06 269.78 37.53 0 -116.24 139.16 1)m + (72)	Dec 145.3 27.78 289.81 37.53 0 -116.24 142.69	heating	 (67) (68) (69) (70) (71) (72)

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

Orientatio	on:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.52	x	10.63	x	0.63	x	0.9	=	85.74	(74)
North	0.9x	0.77	x	20.52	x	20.32	x	0.63	x	0.9	=	163.85	(74)
North	0.9x	0.77	x	20.52	×	34.53	x	0.63	x	0.9	=	278.42	(74)
North	0.9x	0.77	x	20.52	x	55.46	x	0.63	x	0.9	=	447.21	(74)
North	0.9x	0.77	x	20.52	x	74.72	x	0.63	x	0.9	=	602.43	(74)
North	0.9x	0.77	x	20.52	x	79.99	x	0.63	x	0.9	=	644.92	(74)
North	0.9x	0.77	x	20.52	x	74.68	x	0.63	x	0.9	=	602.11	(74)
North	0.9x	0.77	x	20.52	x	59.25	x	0.63	x	0.9	=	477.7	(74)
North	0.9x	0.77	x	20.52	×	41.52	x	0.63	x	0.9	=	334.75	(74)
North	0.9x	0.77	x	20.52	x	24.19	x	0.63	x	0.9	=	195.04	(74)
North	0.9x	0.77	x	20.52	x	13.12	x	0.63	x	0.9	=	105.77	(74)
North	0.9x	0.77	x	20.52	x	8.86	x	0.63	x	0.9	=	71.47	(74)
East	0.9x	2	x	5.13	x	19.64	x	0.63	x	0.9	=	79.18	(76)
East	0.9x	1	x	4.85	x	19.64	x	0.63	x	0.9	=	37.43	(76)
East	0.9x	2	x	5.13	x	38.42	x	0.63	x	0.9	=	154.89	(76)
East	0.9x	1	x	4.85	×	38.42	х	0.63	х	0.9	=	73.22	(76)
East	0.9x	2	x	5.13	x	63.27	x	0.63	x	0.9	=	255.08	(76)
East	0.9x	1	×	4.85	x	63.27	×	0.63	x	0.9	=	120.58	(76)
East	0.9x	2	×	5.13	x	92.28	x	0.63	x	0.9	=	372.02	(76)
East	0.9x	1	×	4.85	×	92.28	x	0.63	x	0.9	=	175.86	(76)
East	0.9x	2	x	5.13	x	113.09	x	0.63	x	0.9	=	455.93	(76)
East	0.9x	1	x	4.85	×	113.09	x	0.63	x	0.9	=	2 <mark>15.52</mark>	(76)
East	0.9x	2	x	5.13	x	115.77	x	0.63	x	0.9	=	466.73	(76)
East	0.9x	1	x	4.85	x	115.77	x	0.63	x	0.9	=	220.63	(76)
East	0.9x	2	x	5.13	x	110.22	x	0.63	x	0.9	=	444.34	(76)
East	0.9x	1	x	4.85	×	110.22	x	0.63	x	0.9	=	210.04	(76)
East	0.9x	2	x	5.13	x	94.68	x	0.63	x	0.9	=	381.68	(76)
East	0.9x	1	x	4.85	x	94.68	x	0.63	x	0.9	=	180.43	(76)
	0.9x	2	x	5.13	x	73.59	x	0.63	x	0.9	=	296.67	(76)
East	0.9x	1	x	4.85	x	73.59	x	0.63	x	0.9	=	140.24	(76)
	0.9x	2	x	5.13	x	45.59	x	0.63	x	0.9	=	183.79	(76)
	0.9x	1	x	4.85	x	45.59	x	0.63	x	0.9	=	86.88	(76)
	0.9x	2	x	5.13	x	24.49	x	0.63	x	0.9	=	98.73	(76)
	0.9x	1	x	4.85	x	24.49	x	0.63	x	0.9	=	46.67	(76)
	0.9x	2	x	5.13	×	16.15	x	0.63	x	0.9	=	65.11	(76)
	0.9x	1	x	4.85	×	16.15	x	0.63	x	0.9	=	30.78	(76)
	0.9x	0.77	x	16.25	×	46.75	x	0.63	x	0.9	=	298.52	(78)
	0.9x	0.77	x	4.28	×	46.75	x	0.63	x	0.9	=	78.63	(78)
South	0.9x	0.77	X	16.25	×	76.57	x	0.63	x	0.9	=	488.9	(78)

	F							-		_	r			
South	0.9x	0.77	×	4.2	8	x	76.57	×	0.63	×	0.9	=	128.77	(78)
South	0.9x	0.77	x	16.2	25	x	97.53	×	0.63	x	0.9	=	622.77	(78)
South	0.9x	0.77	x	4.2	8	x	97.53	×	0.63	x	0.9	=	164.03	(78)
South	0.9x	0.77	x	16.2	25	x	110.23	×	0.63	x	0.9	=	703.86	(78)
South	0.9x	0.77	×	4.2	8	x	110.23	×	0.63	x	0.9	=	185.39	(78)
South	0.9x	0.77	x	16.2	25	x	114.87	×	0.63	x	0.9	=	733.47	(78)
South	0.9x	0.77	x	4.2	8	x	114.87	×	0.63	x	0.9	=	193.18	(78)
South	0.9x	0.77	x	16.2	25	x	110.55	×	0.63	x	0.9	=	705.86	(78)
South	0.9x	0.77	x	4.2	8	x	110.55	×	0.63	x	0.9	=	185.91	(78)
South	0.9x	0.77	×	16.2	25	x	108.01	×	0.63	x	0.9	=	689.67	(78)
South	0.9x	0.77	x	4.2	8	x	108.01	x	0.63	x	0.9	=	181.65	(78)
South	0.9x	0.77	x	16.2	25	x	104.89	×	0.63	x	0.9	=	669.77	(78)
South	0.9x	0.77	x	4.2	8	x	104.89	x	0.63	x	0.9	=	176.41	(78)
South	0.9x	0.77	x	16.2	25	x	101.89	×	0.63	x	0.9	=	650.55	(78)
South	0.9x	0.77	x	4.2	8	x	101.89	×	0.63	x	0.9	=	171.35	(78)
South	0.9x	0.77	x	16.2	25	x	82.59	×	0.63	x	0.9	=	527.32	(78)
South	0.9x	0.77	x	4.2	8	x	82.59	×	0.63	x	0.9	=	138.89	(78)
South	0.9x	0.77	x	16.2	25	×	55.42	x	0.63	x	0.9		353.85	(78)
Sout <mark>h</mark>	0.9x	0.77	×	4.2	8	x	55.42	, x	0.63	x	0.9	=	93.2	(78)
Sout <mark>h</mark>	0.9x	0.77	×	16.2	25	x	40.4	ī 📈	0.63	x	0.9	=	257.95	(78)
Sout <mark>h</mark>	0.9x	0.77	×	4.2	8	x	40.4	 	0.63	x	0.9	=	67.94	(78)
								-						
Solar (jains in	watts, calo	culated	for each	n month			(83)m	= Sum(74)m .	<mark>(8</mark> 2)m				
(83)m=	579.49	1009.62 1	440.87	<mark>1884</mark> .34	2200. <mark>53</mark>	22	24.04 2127.82	2 1885	5.98 1593.56	1131.9	698.21	493.25		(83)
Total g	jains – i	nternal and	d solar	(84)m =	: (73)m ·	+ (8	33)m, watts							
(84)m=	1121.35	1549.22 1	963.12	2378.23	2665.01	26	60.63 2546.55	5 2311	.28 2033.65	1600.	6 1199.8	1020.12		(84)
7. Me	an inter	nal tempe	rature	(heating	season)								
Temp	erature	during hea	ating p	eriods in	the livi	ng a	area from Ta	able 9,	Th1 (°C)				21	(85)
Utilis	ation fac	tor for gain	ns for I	iving are	a, h1,m	ı (se	ee Table 9a)							
	Jan	Feb	Mar	Apr	May	,	Jun Jul	A	ug Sep	Oct	Nov	Dec		
(86)m=	0.99	0.96	0.89	0.72	0.53	C	0.36 0.26	0.:	3 0.51	0.83	0.98	0.99		(86)
Mear	interna	l temperat	ure in l	living are	ea T1 (fo		w steps 3 to	7 in T	able 9c)		-			
(87)m=	19.95	<u> </u>	20.64	20.89	20.98	-	21 21	2	<u>_</u>	20.82	20.32	19.89		(87)
Tomr			ating n	oriode in	rost of	L dw	elling from T	- able (Th2 (°C)					
(88)m=	19.95	<u> </u>	19.95	19.97	19.97	-	9.98 19.98	19.	,	19.97	19.96	19.96		(88)
						L								
	r	<u> </u>		-		1	m (see Table	<u> </u>	3 0.44	0.70	0.07	0.00		(89)
(89)m=	0.99	0.95	0.86	0.67	0.47	L	0.31 0.2	0.2		0.79	0.97	0.99		(03)
	r	<u> </u>		1		<u> </u>	T2 (follow st	- i		<u> </u>			1	
$(00)m_{-}$		1 10 06 1			10 OF	1 1	9.98 19.98	1 10	10 I 10 07	1 10 70	1 10 10	18.49		(90)
(90)m=	18.58	19.06	19.53	19.86	19.95	<u> </u>	9.90 19.90	19.		19.78	19.12 /ing area ÷ (4		0.47	(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m=	19.22	19.63	20.05	20.34	20.43	20.46	20.46	20.46	20.45	20.27	19.68	19.15		(92)
Apply	adjustr	nent to t	he mear	, interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.22	19.63	20.05	20.34	20.43	20.46	20.46	20.46	20.45	20.27	19.68	19.15		(93)
8. Sp	ace hea	ting requ	uirement	t										
Set T	i to the	mean int	ernal te	mperatu	re obtain	ed at ste	ep 11 of	Table 9t	o, so tha	t Ti,m=(76)m an	d re-cald	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a			-						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	ctor for g	ains, hm	n:										
(94)m=	0.99	0.95	0.86	0.69	0.5	0.33	0.23	0.27	0.47	0.8	0.96	0.99		(94)
Usefu	I gains,	hmGm	, W = (9	4)m x (8-	4)m									
(95)m=	1106.12	1471.89	1693.1	1642.16	1320.42	885.54	584.58	613.15	955.31	1283.9	1156.94	1010.77		(95)
Month	nly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an interr	al temp	erature,	Lm , W =	=[(39)m :	x [(93)m-	– (96)m]				
(97)m=	2340.05	2304.55	2114.09	1762.35	1341.44	887.7	584.82	613.66	966.97	1485.07	1942.59	2320.1		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k۱	Nh/mont	th = 0.02	24 x [(97))m – (95)m] x (4′	1)m		I	
(98)m=	918.04	559.55	313.21	86.54	15.64	0	0	0	0	149.67	, 565.67	974.14		
								Tota	l per year	(kWh/vear) = Sum(9	8)15912 =	3582.47	(98)
Creek	. h . atin	~ ~ ~ ~ ~							1 - 7		, (- ,		
Space	e neatin	g require	ement in	KVVN/m ²	/year								26.62	(99)
8c. S	bace co	oling rec	uiremer	nt							_		_	
Calcu	lated fo	<u>r June, J</u>	July and	August.	See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	los <mark>s rat</mark>	e Lm (ca	Iculated	using 2	5°C inter	nal temp	oerature	and exte	ernal ten	npe <mark>ratur</mark>	e from T	able 10)		
(100)m=	0	0	0	0	0	1424.73	1121.6	1148.85	0	0	0	0		(100)
Util <mark>isa</mark>	ation fac	ctor for lo	ss hm											
(101) <mark>m=</mark>	0	0	0	0	0	0.99	1	0.99	0	0	0	0		(101)
Usefu	ıl loss, h	nmLm (V	/atts) =	(100)m >	. (101)m									
(102)m=	0	0	0	0	0	1412.27	1117.51	1141.82	0	0	0	0		(102)
Gains	s (solar	anine en			1		•		U U	Ŭ	Ŭ			
(103)m=		yanis ca	lculated	for appli	cable we	eather re	gion, se	e Table	-					
(100)11-	0		lculated 0	for appli 0	cable we	eather re 3215.28		e Table 2806.39	-	0	0	0		(103)
		0	0	0	0	3215.28	3079.49	1	10) 0	0	0		x (41)m	(103)
Space	e coolin	0	0 ement fo	0 or month,	0 whole c	3215.28	3079.49	2806.39	10) 0	0	0		x (41)m	(103)
Space	e <i>coolin</i> 04)m to	0 g require	0 ement fo	0 or month,	0 whole c	3215.28 Iwelling,	3079.49	2806.39 ous (kW	10) 0 <i>(h)</i> = 0.0	0	0		x (41)m	(103)
Space set (1	e <i>coolin</i> 04)m to	0 g require zero if (0 ement fo 104)m <	0 or month, < 3 × (98	0 <i>whole c</i>)m	3215.28 Iwelling,	3079.49 continuo	2806.39 ous (kW	10) 0 (h) = 0.0.	0 24 x [(10	0 03)m – (0	102)m]:	x (41)m 3996.32	(103)
Space set (1 (104)m=	e coolin 04)m to 0	0 g require 2 zero if (0	0 ement fo 104)m < 0	0 r month, 3 × (98 0	0 <i>whole c</i>)m	3215.28 Iwelling,	3079.49 continuo	2806.39 ous (kW	10) 0 $h) = 0.0$ 0 Total	0 24 x [(10 0	0 03) <i>m - (</i> 0 104)	102)m]: 0 =		_
Space set (1 (104)m= Coolec Intermi	e <i>coolin</i> 04)m tc 0 fractio	0 g require zero if (0	0 ement fo 104)m < 0	0 r month, 3 × (98 0	0 <i>whole c</i>)m	3215.28 Iwelling,	3079.49 continuo	2806.39 ous (kW	10) 0 $h) = 0.0$ 0 Total	0 24 x [(10 0 = Sum(0 03) <i>m - (</i> 0 104)	102)m]: 0 =	3996.32	(104)
Space set (1 (104)m=	e <i>coolin</i> 04)m tc 0 fractio	0 g require 2 zero if (0	0 ement fo 104)m < 0	0 r month, 3 × (98 0	0 <i>whole c</i>)m	3215.28 Iwelling,	3079.49 continuo	2806.39 ous (kW	10) 0 $h) = 0.0$ 0 Total	0 24 x [(10 0 = Sum(0 03) <i>m - (</i> 0 104)	102)m]: 0 =	3996.32	(104)
Space set (1 (104)m= Coolec Intermi (106)m=	e coolin 04)m tc 0 1 fractio ttency f 0	0 g require 2 zero if (0 n factor (Ta	0 ement fo 104)m < 0 able 10b	0 r month, 3 x (98 0	0 whole c)m 0	3215.28 Iwelling, 1298.17 0.25	3079.49 continue 1459.72 0.25	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0 0 Total f C = 0	0 24 x [(10 0 = Sum(cooled a	0 03)m – (0 104) area ÷ (4	102)m]. 0 = 1) =	3996.32	(104)
Space set (1 (104)m= Coolec Intermi (106)m=	e coolin 04)m tc 0 1 fractio ttency f 0	0 g require 2 zero if (0 n factor (Ta	0 ement fo 104)m < 0 able 10b	0 r month, 3 x (98 0	0 whole c)m 0	3215.28 Iwelling, 1298.17 0.25	3079.49 continuo 1459.72	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0 0 Total f C = 0	0 24 x [(10 0 = Sum(cooled a	0 03)m – (0 104) area ÷ (4	102)m]. 0 = 1) = 0	3996.32 0.91	(104) (105)
Space set (1 (104)m= Coolec Intermi (106)m=	e coolin 04)m to 0 fractio ittency f 0 cooling	0 g require 2 zero if (0 n factor (Ta	0 ement fo 104)m < 0 able 10b	0 r month, 3 x (98 0	0 whole c)m 0	3215.28 Iwelling, 1298.17 0.25	3079.49 continue 1459.72 0.25	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0 0 Total f C = 0	0 24 x [(10 0 = Sum(cooled a	0 03)m – (0 104) area ÷ (4	102)m]. 0 = 1) = 0	3996.32 0.91	(104) (105)
Space set (1 (104)m= Coolec Intermi (106)m= Space	e coolin 04)m to 0 fractio ittency f 0 cooling	0 g require 2 zero if (0 n factor (Ta 0 requirer	0 ement fo 104)m < 0 able 10b 0 ment for	0 or month, < 3 × (98 0) 0 month =	0 whole c)m 0	3215.28 Iwelling, 1298.17 0.25 × (105)	3079.49 continuc 1459.72 0.25 × (106)n	2806.39 ous (kW 1238.43 0.25	10) 0 $h) = 0.0$ 0 $Total$ $f C =$ 0 $Total$ 0 $Total$	0 24 x [(10 = Sum(cooled a 0 ! = Sum(0 03)m - (104) area ÷ (4 0 (104) 0	102)m]. 0 = 4) = 0 =	3996.32 0.91	(104) (105)
Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	e coolin 04)m tc 0 fractio ittency f 0 cooling 0	0 g require 2 zero if (0 n factor (Ta 0 requirer	0 ement fo 104)m < 0 able 10b 0 nent for 0	0 or month, 3 × (98 0 0 0 month = 0	0 whole c)m 0 0	3215.28 Iwelling, 1298.17 0.25 × (105)	3079.49 continuc 1459.72 0.25 × (106)n	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0 Total f C = 0 Total 0 Total	0 24 x [(10 = Sum(cooled a 0 t = Sum(0	0 03)m - (104) area ÷ (4 0 (104) 0	102)m] . 0 = 1) = 0 = 0	<u>3996.32</u> 0.91 0	(104) (105) (106)
Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m= Space	e coolin 04)m to 0 fractio ttency f 0 cooling 0	0 g require 2 zero if (0 n cactor (Ta 0 requirer 0	0 ement fo 104)m < 0 able 10b 0 ment for 0 ment in F	0 or month, 3 × (98 0 0 0 month = 0 (Wh/m ² /2	0 whole c)m 0 : (104)m 0 /ear	3215.28 Iwelling, 1298.17 0.25 × (105) 294.16	3079.49 <i>continue</i> 1459.72 0.25 × (106)n 330.77	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0 Total f C = 0 Total 0 Total	0 24 x [(10 0 = Sum(cooled a 0 1 = Sum(0 = Sum(0 03)m - (104) area ÷ (4 0 (104) 0	102)m] . 0 = 1) = 0 = 0	3996.32 0.91 0 905.56	(104) (105) (106)
Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m= Space 9b. En	e coolin 04)m to 0 fractio ttency f 0 cooling 0 cooling ergy rec	0 g require 2 zero if (0 factor (Ta 0 requirer 0 requirer	0 ement fo 104)m < 0 able 10b 0 ment for 0 ment in P	0 or month, 3 × (98 0 0 0 month = 0 (Wh/m²/2 mmunity	0 whole c)m 0 (104)m 0 /ear heating	3215.28 Iwelling, 1298.17 0.25 × (105) 294.16	3079.49 <i>continue</i> 1459.72 0.25 × (106)n 330.77	2806.39 ous (kW 1238.43 0.25	10) 0 <i>(h)</i> = 0.0. Total f C = 0 Total 0 Total (107)	0 $24 \times [(10)]{2$	0 03) <i>m</i> – (104) area ÷ (4 0 104) 0 107)	102)m] . 0 = 4) = 0 = 0 =	3996.32 0.91 0 905.56	(104) (105) (106)

Fraction of space heat from community system $1 - (301) =$				1	(302)
The community scheme may obtain heat from several sources. The procedure allows includes boilers, heat pumps, geothermal and waste heat from power stations. See Ap		our other heat sour	ces; the	latter	_
Fraction of heat from Community heat pump				1	(303a)
Fraction of total space heat from Community heat pump		(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for community h	eating system			1	(305)
Distribution loss factor (Table 12c) for community heating system				1.05	(306)
Space heating Annual space heating requirement			Г	kWh/year 3582.47	1
Space heat from Community heat pump	(98) x (304a) x	(305) x (306) =		3761.6	(307a)
Efficiency of secondary/supplementary heating system in % (from Tal	ble 4a or Appen	dix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 1	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement				2388.47]
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x	(305) x (306) =		2507.9	(310a)
Electricity used for heat distribution	.01 × [(307a)(307	e) + (310a)(310e	e)] =	62.69	(313)
Cooling System Energy Efficiency Ratio				4.77	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)	=		190.02	(315)
Electricity for pumps and fans within dwelling (Table 4f):					- -
mechanical ventilation - balanced, extract or positive input from outsid	de			432.44	(330a)
warm air heating system fans pump for solar water heating				0	(330b) (330g)
Total electricity for the above, kWh/year	=(330a) + (330t	o) + (330g) =		432.44	(331)
Energy for lighting (calculated in Appendix L)				477.34	(332)
Electricity generated by PVs (Appendix M) (negative quantity)				-362.72	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)			0	(334)
12b. CO2 Emissions – Community heating scheme					
	inergy Wh/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two fu	uels repeat (363) to	(366) for the secon	d fuel	132	(367a)
CO2 associated with heat source 1 [(307b)+(310b)]	x 100 ÷ (367b) x	0	=	1025.92	(367)
Electrical energy for heat distribution [(313)	ĸ	0.52	=	32.54	(372)
Total CO2 associated with community systems (363)	.(366) + (368)(372)	=	1058.46	(373)
CO2 associated with space heating (secondary) (309) x		0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous h	neater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating (373) +	· (374) + (375) =			1058.46	(376)

(315) x

(332))) x

CO2 associated with space cooling

CO2 associated with electricity for pumps and fans within dwelling (331)) x

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

 $(383) \div (4) =$

CO2 associated with electricity for lighting

Energy saving/generation technologies (333) to (334) as applicable Item 1

Total CO2, kg/year Dwelling CO2 Emission Rate El rating (section 14)

0.52	=	98.62	(377)
0.52	=	224.43	(378)
0.52	=	247.74	(379)
	. —		-
0.52 × 0.0	1 =	-188.25	(380)
		1441	(383)
		10.71	(384)

(385)

89.25



User Details:											
Assessor Name: Software Name:	Stroma FSAP 201							ion: 1.0.4.7			
Property Address: 5F											
Address : 1. Overall dwelling dime	neione:										
	11510115.	Δr	ea(m²)		Av. Hei	iaht(m)		Volume(m ³)			
Ground floor				(1a) x		.85	(2a) =	275.88	(3a)		
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)		(4)				210.00			
Dwelling volume	275.88	(5)									
_								210.00			
2. Ventilation rate:	main se	econdary	other		total			m ³ per hour			
Number of chimpour	heating h	eating		7 = Г			40 =	-	_		
Number of chimneys			0	- <u>-</u>	0			0	(6a)		
Number of open flues	0 +	0 +	0	=	0	x 2	20 =	0	(6b)		
Number of intermittent fa	INS				0	x 7	10 =	0	(7a)		
Number of passive vents	i				0	x ′	10 =	0	(7b)		
Number of flueless gas fi	ires			Ē	0	X 4	40 =	0	(7c)		
	anges <mark>per</mark> ho	ur									
Infiltration due to chimne					0		÷ (5) =	0	(8)		
If a pressurisation test has b		ed, proceed to (17)	, otherwise o	continue fr	om (9) to (16)			-		
Number of storeys in the Additional infiltration	he dwelling (ns)					[(0)	11-0.4	0	(9)		
	-1]x0.1 =	0	(10)								
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after 0 (11) deducting areas of openings); if equal user 0.35 0.35 0 0											
If suspended wooden		ed) or 0.1 (sea	led), else	enter 0				0	(12)		
If no draught lobby, enter 0.05, else enter 0									(13)		
Percentage of windows and doors draught stripped									(14)		
Window infiltration			0.25 - [0.2	0	(15)						
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$									(16)		
Air permeability value,	3	(17)									
If based on air permeabil	•							0.15	(18)		
Air permeability value applie Number of sides sheltere		s been done or a d	egree air pei	rmeability	is being us	sed		0	(19)		
Shelter factor	<i>,</i> u		(20) = 1 -	[0.075 x (1	9)] =			2 0.85	(13)		
Infiltration rate incorporat	ting shelter factor		(21) = (18)	0.13	(21)						
Infiltration rate modified f	or monthly wind speec	1									
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind sp	beed 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				
		•									

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m	_				
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
	Calculate effective air change rate for the applicable case												(23a)	
	If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)										0.5	(23b)		
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =											72.25	(23c)		
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) \times [1 – (23c												(200)		
(24a)m=													(24a)	
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)														
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	ract ver	tilation o	or positiv	e input v	/entilatic	n from c	utside				1	
,					•	•		c) = (22b		.5 × (23t))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
 d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] 														
(24d)m=	r í	r = r, un		$\frac{111}{0} = \frac{221}{0}$		0	4u)m = 0	0.5 + [(2		0.5	0	0	1	(24d)
			-	_				d) in box	-	0	0	0		(,
(25)m=	0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29		(25)
(20)11-	0.0	0.0	0.20	0.20	0.20	0.20	0.20	0.20	0.27	0.20	0.20	0.20		()
3. He	at losse			paramete										
ELEN		Gros area		Openin m		Net Are A ,n		U-valu W/m2		A X U (W/		k-value		A X k <j k<="" td=""></j>
Windo	ws Type		(111)			5.13		/[1/(1.4)+		6.8				(27)
	ws Type					22.8		/[1/(1.4)+	Ļ	30.23	F.			(27)
Floor		-				96.8		0.065		6.292	Fi r			(28)
Walls		000		45.00							╘┤╞		= –	
Walls		32.2		15.39	·	16.82		0.18		3.03			\dashv	(29)
		11.6		0		11.69		0.18		2.1	╡╏		\dashv	(29)
Walls		24.2		22.8		1.43	×	1.4		2	╡┆		\dashv	(29)
Walls		10.5		0		10.55	5 X	0.16		1.65			\dashv	(29)
Walls		15.3		0		15.39) X	1.4	=	21.55				(29)
		lements				190.8								(31)
				ffective wi nternal wall			ated using	formula 1,	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
			= S (A x					(26)(30)	+ (32) =				87.25	(33)
Heat c	leat capacity $Cm = S(A \times k)$ ((28)(30) + (32) + (32a)(32e) =									0	(34)			
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K Indicative Value: Medium										250	(35)			
	-				constructi	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
			tailed calc	<i>ulation.</i> culated ι	ising An	nondix k	(00.00	
	-				• •	-	`						28.63	(36)
if details of thermal bridging are not known (36) = $0.15 \times (31)$ Total fabric heat loss (33) + (36) = 115.88 (3												(37)		
Ventila	tion hea	at loss ca	alculated	I monthly	/				(38)m	= 0.33 × ((25)m x (5))		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(38)m=	27.43	27.14	26.85	25.4	25.11	23.66	23.66	23.37	24.24	25.11	25.69	26.27		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (38)m	-		
(39)m=	143.31	143.02	142.73	141.28	140.99	139.53	139.53	139.24	140.11	140.99	141.57	142.15		
Stroma	FSAP 201	2 Version:	: 1.0.4.7 (S	AP 9.92) -	http://ww	w.stroma.c	com			Average =	Sum(39)1	12 /12=	141.pag	<u>ge 2 of 39)</u>

Heat lo	ss para	ımeter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.48	1.48	1.47	1.46	1.46	1.44	1.44	1.44	1.45	1.46	1.46	1.47		
			L	I					ļ,	Average =	Sum(40)1	12 /12=	1.46	(40)
Numbe		/s in mo		, ,		i .	<u> </u>	<u>.</u>			<u> </u>	<u> </u>	I	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF/	A > 13.	upancy, 9, N = 1 9, N = 1		(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		71		(42)
Reduce t	the annua	al average	hot water		5% if the c	welling is	designed	(25 x N) to achieve		se target o		.51		(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=	108.36	104.42	100.48	96.54	92.6	88.66	88.66	92.6	96.54	100.48	104.42	108.36		
Energy c	ontent of	hot water	used - ca	lculated m	onthly - 4	190 x Vd i	т х пт х Г	0 Tm / 3600			m(44) ₁₁₂ =		1182.14	(44)
r	160.7	140.55		126.44	121.33	104.69	97.02	111.33	112.66	131.29	143.31	155.63		
(45)m=	160.7	140.55	145.03	120.44	121.33	104.69	97.02	111.33	L		<u> </u>		1549.97	(45)
lf instanta	aneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		10tal = 5u	m(45) ₁₁₂ =	-	1549.97	(43)
(46)m=	24.1	21.08	21.76	18.97	18.2	15.7	14.55	16.7	16.9	19.69	21.5	23.34		(46)
Water a	-													
				-				within sa	ame ves	sel		200		(47)
		•		ank in dw	•			· · ·		or (0) in ((17)			
Water s			not wate	er (this ir	iciudes i	nstantar	ieous co	ombi boil	ers) ente	er u in (47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/dav).				2	24		(48)
		actor fro					<i>"</i> alog <i>y</i>]					.6		(49)
				· –∼ e, kWh/ye	ear			(48) x (49)) =					(50)
•••			-	cylinder		or is not		(40) X (40)	, –		I.	34		(30)
Hot wa	ter stor	age loss	factor fi	rom Tab								0		(51)
	•	heating s		on 4.3									I	
		from Ta										0		(52)
-		actor fro										0		(53)
		m water (54) in (5	-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	. , .		for each	month			((56)m = ((55) v (<i>1</i> 1)	m	1.	34		(55)
г				-	1	1				 	1		1	(50)
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66 0), else (5	40.32	41.66	40.32	41.66	iv Ll	(56)
г				,				,						()
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
-		•	,	om Table								0		(58)
						,	. ,	65 × (41)		u 41a	atat)			
Ċ		· · · · · ·	r	ı —	· · · · · ·	· · · · · · · · · · · · · · · · · · ·	r	ng and a	· ·	i	, 	00.00		
(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	n 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	eat req	uired for	water h	eating ca	alculated	for eac	ch month	(62)m =	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	225.63	199.19	209.96	189.28	186.25	167.53	161.94	176.25	175.49	196.22	206.14	220.55		(62)
Solar DH	W input	calculated	using App	bendix G o	r Appendix	H (nega	tive quantity	/) (enter '0)' if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	l lines if	FGHRS	and/or	WWHRS	applies	s, 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=	225.63	199.19	209.96	189.28	186.25	167.53	161.94	176.25	175.49	196.22	206.14	220.55		
								Out	put from w	ater heate	r (annual)₁	12	2314.43	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	+ (61)n	n] + 0.8 >	۲ ((46)m	+ (57)m	+ (59)m]	
(65)m=	105.37	93.65	100.16	92.31	92.28	85.08	84.2	88.96	87.72	95.59	97.92	103.69		(65)
inclu	de (57)	m in calo	ulation	of (65)m	only if c	ylinder	is in the o	dwelling	or hot w	ater is fi	rom com	munity h	neating	
5. Int	ernal g	ains (see	Table :	5 and 5a):									
		ns (Table			,									
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	135.39	135.39	135.39	135.39	135.39	135.39	135.39	135.39	135.39	13 <mark>5.39</mark>	135.39	135.39		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion L9 d	r L9a), a	lso see	Table 5					
(67)m=	2 <mark>2.38</mark>	19.88	1 <mark>6</mark> .17	12.24	9.15	7.72	8.35	10.85	14.56	18.49	21.58	23		(67)
Appliar	nces da	ins (calc	ulated i	n Appene	dix L. ea	uation I	13 or L1	3a), also	see Ta	ble 5	1		1	
(68)m=		253.65	247.09	233.11	215.47	198.89	187.81	185.21	191.77	205.75	223.39	239.97		(68)
		(calcula	ited in A	ı opendix	L. equat	ion L15	or L15a	, also se	ee Table	5			1	
(69)m=	36.54	36.54	36.54	36.54	36.54	36.54	36.54	36.54	36.54	36.54	36.54	36.54	1	(69)
Pumps	and fa	ns gains	(Table	5a)										
(70)m=	0		0		0	0	0	0	0	0	0	0]	(70)
		I vaporatio	n (nega	I itive valu		le 5)			I		1		1	
1	<u> </u>			1	r , ,	,	-108.31	-108.31	-108.31	-108.31	-108.31	-108.31	1	(71)
		gains (T											1	
(72)m=	141.63	139.36	134.63	128.21	124.03	118.16	113.17	119.57	121.84	128.49	136	139.37	1	(72)
		gains =		_			67)m + (67)m		+ (69)m + (1	. ,
(73)m=	478.68	476.51	461.5	437.18	412.27	388.39	372.95	379.24	391.79	416.34	444.58	465.96	1	(73)
. ,	ar gain:		10 110	101110	[<u>-</u>	000100	012.00	010121		1 toto 1		100100		· · ·
			using sola	ar flux from	Table 6a	and asso	ciated equa	tions to co	onvert to th	e applicat	ole orientat	ion.		
Orienta	ation:	Access F	actor	Area		FI	лх		g_		FF		Gains	
	-	Table 6d		m²		Ta	ble 6a	Т	able 6b	Т	able 6c		(W)	
East	0.9x	3	x	5.1	13	x	19.64	x	0.63	X	0.1	=	13.2	(76)
East	0.9x	3	×	5.	13	x	38.42	x	0.63		0.1	=	25.82	(76)
East	0.9x	3	x				63.27	×	0.63	× [0.1	=	42.51	(76)
East	0.9x	3	×	5.	13	x	92.28	×	0.63		0.1	=	62	(76)
East	0.9x	3	x	5.	13	x	113.09	x	0.63	× [0.1	=	75.99	(76)

	_	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$													
East	0.9x	3	x	5.13	3	<	115.77	×	0.63	x	0.1	=	77.79	(76)	
East	0.9x	3	x	5.13	3	(110.22	x	0.63	x	0.1	=	74.06	(76)	
East	0.9x	3	x	5.13	3	<	94.68	x	0.63	x	0.1	=	63.61	(76)	
East	0.9x	3	x	5.13	3	<	73.59	x	0.63	x	0.1	=	49.45	(76)	
East	0.9x	3	x	5.13	3	<	45.59	x	0.63	x	0.1	=	30.63	(76)	
East	0.9x	3	x	5.13	3	<	24.49	x	0.63	x	0.1	=	16.45	(76)	
East	0.9x	3	x	5.13	3 3	<	16.15	x	0.63	x	0.1	=	10.85	(76)	
South	0.9x	0.77	x	22.8	3 >	<	46.75	x	0.63	x	1	=	465.38	(78)	
South	0.9x	0.77	x	22.8	3 >	<	76.57	x	0.63	x	1	=	762.18	(78)	
South	0.9x	0.77	x	22.8	3)	<	97.53	x	0.63	x	1	=	970.88	(78)	
South	0.9x	0.77	x	22.8	3)	<	110.23	x	0.63	×	1	=	1097.3	(78)	
South	0.9x	0.77	x	22.8	3)	<	114.87	x	0.63	×	1	=	1143.46	(78)	
South	0.9x	0.77	×	22.8	3)	,	110.55] x [0.63	×	1		1100.42	(78)	
South	0.9x	0.77	×	22.8	3)	,	108.01	x	0.63	×	1	= =	1075.18	(78)	
South	0.9x	0.77	×	22.8	3)	<	104.89	x	0.63	×	1	= =	1044.15	(78)	
South	0.9x	0.77	×	22.8	3)	,	101.89] x [0.63	×	1		1014.2	(78)	
South	0.9x	0.77	x	22.8	3)	,	82.59	x	0.63	×	1	= =	822.08	(78)	
Sout <mark>h</mark>	0.9x	0.77	×	22.8	3		55.42	х	0.63	x	1	=	551.64	(78)	
South	0.9x	0.77	×	22.8	3)	~	40.4	x	0.63	x	1	=	402.13	(78)	
Solar o	iains in	watts, calo	culated	for each	month			(83)m	= Sum(74)m	(82)m					
(83)m=	478.58		013.39	i		1178.21	1149.23	r í		852.7 ²	568.09	412.98	1	(83)	
Tota <mark>l g</mark>	ains – i	nternal an	d solar	(84)m =	(73)m +	(83)m	, watts						'		
(84)m=	957.26	1264.5	474.89	1596.48	1631.72	1566.6	1522.18	148	37 1455.43	12 <mark>69.0</mark>	5 1012.67	878.94]	(84)	
7. Me	an inter	nal tempe	rature	(heating	season)			•							
		during he		, o	í í	g area	from Tab	ole 9.	Th1 (°C)				21	(85)	
		tor for gai	• •			-									
	Jan	<u> </u>					able 9a)		iiii (0)						
		Feb	Mar	Apr	May	Jun	able 9a) Jul		- i - i	Oct	Nov	Dec]		
(86)m=	0.99	0.96	Mar 0.91	Apr 0.83			· · · ·	Au 0.4	ug Sep	Oct 0.86	Nov 0.97	Dec 0.99]	(86)	
	0.99	0.96	0.91	0.83	May 0.71	Jun 0.55	Jul 0.4	Au 0.4	ug Sep 2 0.62]	(86)	
Mean	0.99 interna	0.96 I temperat	0.91 ture in	0.83 iving are	May 0.71 a T1 (fo	Jun 0.55 Ilow ste	Jul 0.4 eps 3 to 7	Au 0.4 7 in T	ug Sep 2 0.62 able 9c)	0.86	0.97	0.99]	(86)	
Mean (87)m=	0.99 interna 19.67	0.96 I temperat 20	0.91 ture in 20.34	0.83 iving are 20.65	May 0.71 a T1 (fo 20.86	Jun 0.55 Ilow st	Jul 0.4 eps 3 to 7 20.99	Au 0.4 7 in T 20.9	ug Sep 2 0.62 able 9c) 99 20.94		0.97]		
Mean (87)m= Temp	0.99 interna 19.67 erature	0.96 I temperat 20 during he	0.91 ture in 1 20.34 ating p	0.83 iving are 20.65 eriods in	May 0.71 a T1 (fo 20.86 rest of c	Jun 0.55 Ilow sto 20.96 dwellin	Jul 0.4 eps 3 to 7 20.99 g from Ta	Au 0.4 7 in T 20.9 able 9	ug Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C)	0.86	0.97	0.99]	(87)	
Mean (87)m=	0.99 interna 19.67	0.96 I temperat 20 during he	0.91 ture in 20.34	0.83 iving are 20.65	May 0.71 a T1 (fo 20.86	Jun 0.55 Ilow st	Jul 0.4 eps 3 to 7 20.99	Au 0.4 7 in T 20.9	ug Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C)	0.86	0.97	0.99]]]		
Mean (87)m= Temp (88)m= Utilisa	0.99 interna 19.67 erature 19.7 ation fac	0.96 I temperat 20 during he 19.7 ctor for gai	0.91 ture in 1 20.34 ating p 19.71 ns for r	0.83 iving are 20.65 eriods in 19.72 rest of dw	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h	Jun 0.55 Ilow sta 20.96 dwellin 19.73 2,m (s	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 eee Table	Au 0.4 7 in T 20.9 able 9 19.7	ug Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C) 73 19.73	0.86	0.97 20.09 19.72	0.99 19.61 19.71]]]	(87)	
Mean (87)m= Temp (88)m=	0.99 interna 19.67 erature 19.7	0.96 I temperat 20 during he 19.7	0.91 ture in 20.34 ating p 19.71	0.83 iving are 20.65 eriods in 19.72	May 0.71 a T1 (fo 20.86 rest of c 19.72	Jun 0.55 llow stu 20.96 dwellin 19.73	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73	Au 0.4 7 in T 20.9 able 9 19.7	ug Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C) 73 19.73	0.86	0.97	0.99]]]]	(87)	
Mean (87)m= Temp (88)m= Utilisa (89)m=	0.99 interna 19.67 erature 19.7 ation fac 0.98	0.96 I temperat 20 during he 19.7 ctor for gai 0.95	0.91 ture in 1 20.34 ating p 19.71 ns for r 0.89	0.83 iving are 20.65 eriods in 19.72 rest of dw 0.79	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h 0.64	Jun 0.55 Ilow sta 20.96 dwellin 19.73 12,m (s 0.45	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 see Table 0.29	Au 0.4 7 in T 20.9 able 9 19.7 9a) 0.3	ug Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C) 73 19.73	0.86	0.97 20.09 19.72	0.99 19.61 19.71]]]	(87) (88)	
Mean (87)m= Temp (88)m= Utilisa (89)m=	0.99 interna 19.67 erature 19.7 ation fac 0.98	0.96 I temperat 20 during he 19.7 ctor for gai 0.95 I temperat	0.91 ture in 1 20.34 ating p 19.71 ns for r 0.89	0.83 iving are 20.65 eriods in 19.72 rest of dw 0.79	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h 0.64	Jun 0.55 Ilow sta 20.96 dwellin 19.73 12,m (s 0.45	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 see Table 0.29	Au 0.4 7 in T 20.9 able 9 19.7 9a) 0.3	Jg Sep 2 0.62 able 9c) 9 99 20.94 9, Th2 (°C) 73 19.73 1 0.52 to 7 in Table	0.86	0.97 20.09 19.72 0.96	0.99 19.61 19.71]]]]	(87)	
Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	0.99 interna 19.67 erature 19.7 ation fac 0.98 interna	0.96 I temperat 20 during he 19.7 ctor for gai 0.95 I temperat	0.91 ture in 1 20.34 ating p 19.71 ns for r 0.89 ture in 1	0.83 iving are 20.65 eriods in 19.72 est of dw 0.79 the rest of	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h 0.64	Jun 0.55 10w str 20.96 dwellin 19.73 0.45 0.45	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 eee Table 0.29 follow stee	Au 0.4 7 in T 20.9 19.7 9a) 0.3 eps 3	Jg Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C) 73 19.73 1 0.52 to 7 in Table 73 19.69	0.86 20.66 19.72 0.81 e 9c) 19.38	0.97 20.09 19.72 0.96	0.99 19.61 19.71 0.99 17.91	0.41	(87) (88) (89)	
Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	0.99 interna 19.67 erature 19.7 ation fac 0.98 interna 18	0.96 I temperat 20 during he 19.7 ctor for gai 0.95 I temperat 18.47	0.91 ture in 1 20.34 ating p 19.71 ns for r 0.89 ture in 1 18.94	0.83 iving are 20.65 eriods in 19.72 rest of dw 0.79 the rest of 19.36	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h 0.64 0.64	Jun 0.55 Ilow str 20.96 dwellin 19.73 a2,m (s 0.45 ng T2 (19.71	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 eee Table 0.29 follow stee 19.73	Au 0.4 7 in T 20.9 able 9 19.7 9a) 0.3 eps 3 19.7	Jg Sep 2 0.62 able 9c) 99 20.94 9, Th2 (°C) 73 19.73 1 0.52 to 7 in Table 73 19.69	0.86 20.66 19.72 0.81 e 9c) 19.38	0.97 20.09 19.72 0.96 18.62	0.99 19.61 19.71 0.99 17.91]]]] 	(87) (88) (89) (90)	
Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	0.99 interna 19.67 erature 19.7 ation fac 0.98 interna 18	0.96 I temperat 20 during he 19.7 ctor for gai 0.95 I temperat 18.47	0.91 ture in 1 20.34 ating p 19.71 ns for r 0.89 ture in 1 18.94	0.83 iving are 20.65 eriods in 19.72 rest of dw 0.79 the rest of 19.36	May 0.71 a T1 (fo 20.86 rest of c 19.72 /elling, h 0.64 0.64	Jun 0.55 Ilow str 20.96 dwellin 19.73 a2,m (s 0.45 ng T2 (19.71	Jul 0.4 eps 3 to 7 20.99 g from Ta 19.73 eee Table 0.29 follow stee 19.73	Au 0.4 7 in T 20.9 able 9 19.7 9a) 0.3 eps 3 19.7	Jg Sep 2 0.62 able 9c) 9 99 20.94 9, Th2 (°C) 73 19.73 1 0.52 to 7 in Table 73 19.69 6, Th2 (°C) 73 1 0.52 to 7 in Table 73 19.69 1 0.52	0.86 20.66 19.72 0.81 e 9c) 19.38	0.97 20.09 19.72 0.96 18.62	0.99 19.61 19.71 0.99 17.91]]]] 	(87) (88) (89) (90)	

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

(93)m=	18.69	19.1	19.51	19.89	20.12	20.23	20.25	20.25	20.2	19.9	19.22	18.61		(93)
8. Spa	ace hea	ting requ	uirement	i										
				mperatui using Ta		ied at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	• 1:										
(94)m=	0.98	0.94	0.89	0.8	0.66	0.49	0.33	0.36	0.56	0.82	0.95	0.98		(94)
Usefu	l gains,	hmGm ,	, W = (9-	4)m x (84	4)m									
(95)m=	935.23	1190.73	1306.53	1269.53	1080.98	763.23	505.76	531.25	814.72	1040.57	963.34	863.8		(95)
Month	ly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m-	– (96)m]				
(97)m=	2062.21	2031.21	1857.55	1552.43	1186.96	785.18	509.13	535.9	855.07	1311.56	1716.42	2048.45		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Nh/mont	h = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m			
(98)m=	838.48	564.8	409.96	203.68	78.84	0	0	0	0	201.62	542.22	881.38		
ľ			<u>I</u>			<u> </u>		Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3720.98	(98)
Space	e heatin	g require	ement in	kWh/m²	/year								38.44	(99)
8c. Sp	bace co	oling rec	luiremer	nt										
Calcu	lated fo	r June, J	July and	August.	See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
He <mark>at I</mark>	os <mark>s rate</mark>	e Lm (ca	Iculated	using 25	5°C int <mark>e</mark> r	nal temp	berature	and exte	ernal ten	npe <mark>ratur</mark>	e from T	able 10)		
(100)m=	0	0	0	0	0	1 <mark>3</mark> 11.62	1032.55	1058.26	0	0	0	0		(100)
Util <mark>isa</mark>	ition fac	tor for lo	oss hm											
(101)m=	0	0	0	0	0	0.93	0.96	0.96	0	0	0	0		(101)
Us <mark>efu</mark>	l loss, h	mLm (V	/atts) =	(100)m x	: (101)m									
(102) <mark>m=</mark>	0	0	0	0	0	1214.78	992.56	1010.95	0	0	0	0		(102)
Gains	(solar	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	1919.56	1865.73	1826.01	0	0	0	0		(103)
Space	e coolin	g require	ement fo	r month,	whole c	lwelling,	continu	ous (kW	(h) = 0.0	24 x [(10)3)m – (102)m]:	x (41)m	
· · ·	04)m to	zero if (104)m <	: 3 × (98)m								1	
(104)m=	0	0	0	0	0	507.44	649.64	606.41	0	0	0	0		_
										= Sum(=	1763.49	(104)
Cooled									f C =	cooled a	area ÷ (4	4) =	0.73	(105)
		actor (Ta		Í								-	I	
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		-
•					(10.0)		(())		Total	l = Sum((104)	=	0	(106)
· ·		· ·		month =	. ,	<u> </u>	· ,	r					l	
(107)m=	0	0	0	0	0	93.18	119.29	111.35	0	0	0	0		
									lotal	= Sum(107)	=	323.82	(107)
Space	cooling	requirer	ment in l	«Wh/m²/y	/ear				(107)) ÷ (4) =			3.35	(108)
9b. Ene	ergy red	quiremer	nts – Coi	mmunity	heating	scheme								_
								ting prov (Table 1´			unity scł	neme.	0	(301)
i iacii0	n or spa	ave nedl	1011 50	conuary/	Suppleti	icinal y I	cauny		1,0111				0	(301)

Fraction of space heat from community system 1 - (301) =

The community scheme may obtain heat from several sources. The pro- includes boilers, heat pumps, geothermal and waste heat from power s		our other heat sour	ces; the	latter	-
Fraction of heat from Community heat pump				1	(303a)
Fraction of total space heat from Community heat pump		(302) x (303a) =		1	(304a)
Factor for control and charging method (Table 4c(3)) for	community heating system			1	(305)
Distribution loss factor (Table 12c) for community heating	g system			1.05	(306)
Space heating			_	kWh/year	-
Annual space heating requirement				3720.98	ļ
Space heat from Community heat pump	(98) x (304a) x	(305) x (306) =		3907.03	(307a)
Efficiency of secondary/supplementary heating system in	n % (from Table 4a or Appen	dix E)		0	(308
Space heating requirement from secondary/supplementa	ary system (98) x (301) x 10	00 ÷ (308) =		0	(309)
Water heating Annual water heating requirement If DHW from community scheme:				2314.43]
Water heat from Community heat pump	(64) x (303a) x			2430.15	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	e) + (310a)…(310e	e)] =	63.37	(313)
Cooling System Energy Efficiency Ratio				4.77	(314)
Space cooling (if there is a fixed cooling system, if not er Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input				67.95 310.99	(315) (330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b	b) + (330g) =		310.99	(331)
Energy for lighting (calculated in Appendix L)				395.26	(332)
Electricity generated by PVs (Appendix M) (negative qua	ntity)			-259.09	(333)
Electricity generated by wind turbine (Appendix M) (nega				0	(334)
12b. CO2 Emissions – Community heating scheme			L		
	Energy kWh/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	CHP) HP using two fuels repeat (363) to ((366) for the secor	d fuel	132	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0	=	1036.99	(367)
Electrical energy for heat distribution	[(313) x	0.52	=	32.89	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	=	1069.88	(373)
CO2 associated with space heating (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater or inst	tantaneous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		.	1069.88	(376)
CO2 associated with space cooling	(315) x	0.52	=	35.27	(377)

CO2 associated with electricity for pum	ps and fans within dw	velling (331)) x	0	.52	=	161.41	(378)
CO2 associated with electricity for light	ing	(332))) x	0	.52	=	205.14	(379)
Energy saving/generation technologies Item 1	(333) to (334) as app	licable	0.52	× 0.0	01 =	-134.47	(380)
Total CO2, kg/year	sum of (376)(382) =			_	Γ	1337.23	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				Ē	13.81	(384)
El rating (section 14)						87.36	(385)



		U	ser Detai	S:					
Assessor Name: Software Name:	Stroma FSAP 201	2		oma Num tware Ve			Versio	n: 1.0.4.7	
		Prop	perty Add	ess: 6F					
Address :									
1. Overall dwelling dime	ensions:								
Ground floor		Г	Area(m ²			ight(m)		Volume(m ³	<i>.</i>
	-) - (41) - (4 -) - (4 - 1) - (4 -)	75.1	(1a) x	2	.85	(2a) =	214.03	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	75.1	(4)			(0)		_
Dwelling volume				(3a)+(3b	o)+(3c)+(3d	1)+(3e)+	.(3n) =	214.03	(5)
2. Ventilation rate:	-	_							
		econdary eating	othe	r	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 fa	ins				0	x	10 =	0	(7a)
Number of passive vents	3			Γ	0	x	10 =	0	(7b)
Number of flueless gas f	ires			Ī	0	× 4	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne					0		÷ (5) =	0	(8)
If a pressurisation test has b		ed, proceed to	(17), other	vise continue f	rom (9) to ((16)			_
Number of storeys in t Additional infiltration	he dwelling (ns)					[(0)	11-0.1 -	0	(9)
Structural infiltration: 0	25 for steel or timber t	frame or 0 '	35 for ma	sonry const	ruction	[(9)	-1]x0.1 =	0	(10) (11)
	resent, use the value corres							0	
deducting areas of openi		N 0.4.4	, I N						_
If suspended wooden	, i i i i i i i i i i i i i i i i i i i	ed) or 0.1 ((sealed), e	lse enter 0				0	(12)
If no draught lobby, en		rippod					·	0	(13)
Percentage of window Window infiltration	s and doors draught st	npped	0.25	[0.2 x (14) ÷	1001 =			0	(14)
Infiltration rate				(10) + (11) + (+ (15) =		0	(15) (16)
Air permeability value,	a50 expressed in cub	ic metres n					area	3	(17)
If based on air permeabi		-		•				0.15	(18)
' Air permeability value applie					is being u	sed		0.10	
Number of sides sheltered	ed							3	(19)
Shelter factor			(20) :	= 1 - [0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor		(21) :	= (18) x (20) =				0.12	(21)
Infiltration rate modified f	or monthly wind speed		i					l.	
Jan Feb	Mar Apr May	Jun	Jul A	ug 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								
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95 0	0.95 0.9	02 1	1.08	1.12	1.18		
	· · · ·			•	•	•		I	

Adjust	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_	
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
	ate effecter echanica		•	rate for t	he appli	cable ca	se							(22.2)
				andix N (2	3h) - (23a	a) v Emv (e	acuation (1	N5)) , othe	rwise (23h) – (23a)			0.5	(23a)
			0 11		, (, ,	• •	n Table 4h	,) – (200)			0.5	(23b)
			-	-	-			HR) (24a) b) m i (22h) v [1 (220)	73.1	(23c)
(24a)m=		0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	230) x [0.27	0.27] - 100j	(24a)
								I 0.24 MV) (24b				0.21		()
(24b)m=								0	0 = (22)	0	230)	0	1	(24b)
				-	-			n from c	-		Ů]	()
,					•	•		c) = (22t		5 × (23b))			
(24c)m=	r í	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) lf	natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from l	oft				1	
,	if (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)					
(25)m=	0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(25)
3. He	at losse	s and he	eat loss p	paramete	er:									
		Gros		Openin		Net Ar	rea	U-valu	Je	AXU		k-value	e	AXk
		area	(m²)	m	12	A ,r		W/m2	_	(W/I	K)	kJ/m².	к	kJ/K
Windo	WS					19.95	5 x1	/[1/(1.4)+	0.04] =	26.45				(27)
Floor						75.1	x	0.065	_ = [4.8815				(28)
Walls [·]	Type1	23.9	94	0		23.94	4 ×	0.16	=	3.75				(29)
Walls ⁻	Type2	28.7	'8	0		28.78	3 X	0.16	=	4.51				(29)
Walls	ТуреЗ	21.6	6	19.9	5	1.71	x	1.4	=	2.39				(29)
Walls ⁻	Type4	10.8	3	0		10.83	3 X	0.16	=	1.7				(29)
Total a	area of e	lements	, m²			160.3	1							(31)
	ndows and le the area						lated using	g formula 1	/[(1/U-valu	e)+0.04] a	as given in	paragrapl	n 3.2	
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				43.69	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	ign assess used instea				constructi	ion are noi	t known pr	recisely the	e indicative	values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix I	K						24.05	(36)
	s of therma		are not kn	own (36) =	= 0.15 x (3	1)								
	abric he								(33) +	(36) =			67.74	(37)
Ventila	ation hea		1			-		I .	. ,	= 0.33 × (1	1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	4	
(38)m=	19.97	19.76	19.56	18.53	18.33	17.3	17.3	17.1	17.71	18.33	18.74	19.15	J	(38)
Heat ti	ransfer o	coefficier	nt, W/K	· · · · ·					(39)m	= (37) + (3	38)m		1	
(39)m=	87.71	87.5	87.3	86.27	86.07	85.04	85.04	84.84	85.45	86.07	86.48	86.89		
									/	Average =	Sum(39)1	₁₂ /12=	86.22	(39)

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.17	1.17	1.16	1.15	1.15	1.13	1.13	1.13	1.14	1.15	1.15	1.16		
Numbo	r of day		nth (Tab	l <u> </u>				1	,	Average =	Sum(40)1.	12 /12=	1.15	(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)
Ĺ							I	I					l	
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	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13.		36]	(42)
Reduce	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.33]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г	-		-	ach month 1	1			 I					1	
(44)m=	99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36	4000.05	
Energy c	ontent of	hot water	used - ca	culated mo	onthly $= 4$.	190 x Vd,ı	m x nm x E	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		1083.95	(44)
(45)m=	147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	12 <mark>0.38</mark>	131.41	142.7		-
lf instanta	aneous w	ater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1421.23	(45)
(46)m=	22.1	19.33	19.95	17. <mark>39</mark>	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
Water s	-		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		200	1	(47)
-				ank in dw										
			hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
Water s	-		olorod	oss facto	or ia kao	wp /k///	o/dov/)·						1	(40)
,			m Table				i/uay).					24		(48) (49)
				. ∠b e, kWh/ye	ear			(48) x (49)) =		<u> </u>	.6 34		(43)
0,			•	cylinder l		or is not		(-/ (-)	, 			54		(00)
		•		rom Tabl	le 2 (kW	h/litre/da	ay)					0		(51)
	•	from Ta	ee secti ble 2a	on 4.3								0		(52)
			m Table	2b								0		(53)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter ((50) or ((54) in (5	55)								1.	34		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
If cylinde	r contains	s dedicate	d solar sto	orage, (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=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
-		•	,	om Table								0		(58)
					,	,	. ,	65 × (41)			-1-1			
. r	-	1	r	r	i	· · · · · · · · · · · · · · · · · · ·	r	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]	(59)

Combi	loss ca	alculated	for each	n 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	eat rec	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=	212.28	187.52	197.91	178.77	176.17	158.83	153.88	167.01	166.13	185.31	194.24	207.63		(62)
Solar DI	-IW input	calculated	using App	pendix G o	r Appendix	H (negat	ive quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	al lines if	FGHRS	and/or	WWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from v	vater hea	ter											
(64)m=	212.28	187.52	197.91	178.77	176.17	158.83	153.88	167.01	166.13	185.31	194.24	207.63		_
								Out	out from w	ater heate	r (annual)₁	12	2185.68	(64)
Heat g	ains fro	om water	heating	, kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	100.94	89.77	96.16	88.82	88.93	82.19	81.52	85.88	84.61	91.97	93.96	99.39		(65)
inclu	ide (57)m in calo	culation	of (65)m	only if c	ylinder	is in the a	dwelling	or hot w	vater is fi	rom com	munity h	leating	
5. In	ternal g	ains (see	Table	5 and 5a):									
Metab	olic dai	ns (Table	. 5). Wa	tts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	11 <mark>8.17</mark>	118.17	118.17		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equati	ion L9 c	r L9a), a	lso see	Table 5					
(67)m=	18.62	16.54	13.45	10.18	7.61	6.43	6.94	9.03	12.12	15.38	17.96	19.14		(67)
Applia	nces da	ains (calc	ulated i	n Appene	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	208.9	211.06	205.6	193.97	179.29	165.5	156.28	154.11	159.57	171.2	185.88	199.68		(68)
		s (calcula					L	also se						
(69)m=	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82		(69)
		ins gains									I			
(70)m=					0	0	0	0	0	0	0	0		(70)
		vaporatio	n (neas	l ative valu	L As) (Tab		_				-			
	-94.53		· •	-	, , 1	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	l	(71)
		gains (T		0.000		0.100	0.000	0 1100	0 1100	0.100		0 1100		
(72)m=	135.67	<u>, , , , , , , , , , , , , , , , , , , </u>	129.25	123.36	119.53	114.15	109.57	115.43	117.52	123.61	130.5	133.59	l	(72)
				120.00	110.00)m + (67)m							(/
(73)m=	421.64	I gains = 419.63	406.75	385.96	364.89	344.52	331.24	337.02	347.66	368.65	392.79	410.86	l	(73)
. ,	lar gain		400.75	303.90	304.09	344.32	331.24	337.02	347.00	300.03	392.19	410.00		(10)
		calculated	usina sola	ar flux from	Table 6a a	and asso	ciated equa	tions to co	onvert to th	ne applicat	ole orientat	ion.		
-		Access F	-	Area		Flu			g_		FF		Gains	
		Table 6d		m²			ble 6a	Т	able 6b	Т	able 6c		(W)	
North	0.9x	0.77	×	19.	.95	x	10.63	x	0.63	ר × ר	1		92.62	(74)
North	0.9x	0.77	×				20.32		0.63	╡╷╞	1		176.99	(74)
North	0.9x	0.77	x				34.53		0.63		1		300.76	(74)
North	0.9x	0.77	x		.95		55.46		0.63		1		483.09	(74)
North	0.9x	0.77	x		.95		74.72		0.63		1		650.77	(74)
NOTUT	0.9X	0.77	X	19.	.95	x	74.72	×	0.63	×	1	=	650.77	(74)

	_															
North	0.9x	0.77	x	19.	95	x	7	9.99	×	0.63		×	1	=	696.67	(74)
North	0.9x	0.77	x	19.	95	x	7	4.68	×	0.63		×	1	=	650.43	(74)
North	0.9x	0.77	x	19.	95	x	5	9.25	×	0.63		x	1	=	516.03	(74)
North	0.9x	0.77	x	19.	95	x	4	1.52	x	0.63) x [1	=	361.61	(74)
North	0.9x	0.77	x	19.	95	x	2	4.19	×	0.63) x [1	=	210.69	(74)
North	0.9x	0.77	x	19.	95	x	1	3.12	x	0.63) x [1	=	114.25	(74)
North	0.9x	0.77	x	19.	95	x	8	3.86	x	0.63) x [1	=	77.21	(74)
Solar g	gains in	watts, ca	lculated	for eac	h month	Ì			(83)m	= Sum(74))m	(82)m	-	-	_	
(83)m=	92.62	176.99	300.76	483.09	650.77	6	96.67	650.43	516.	03 361.6	51	210.69	114.25	77.21		(83)
Total g	jains – i	nternal a	nd solar	⁻ (84)m =	= (73)m	+ (8	83)m ,	, watts	-						•	
(84)m=	514.25	596.63	707.51	869.06	1015.66	10	041.19	981.67	853.	06 709.2	26	579.34	507.04	488.07		(84)
7. Me	an inter	nal temp	erature	(heating	seasor	I)										
Temp	erature	during h	eating p	eriods ir	n the livi	ng	area f	rom Tab	ole 9,	Th1 (°C)				21	(85)
Utilisa	Utilisation factor for gains for living area, h1,m (see Table 9a)															
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ig Se	р	Oct	Nov	Dec]	
(86)m=	1	0.99	0.97	0.9	0.72	(0.51	0.38	0.4	5 0.75	5	0.96	0.99	1	1	(86)
Mean	interna	l tempera	ature in	living ar	ea T1 (f		w stei	os 3 to 7	in Ta	able 9c)			•		-	
(87)m=	19.81	19.98	20.28	20.67	20.92	T	0.99	21	21		3	20.57	20.13	19.78		(87)
Tom		during h	ooting n			du	alling	from To		Th2 (%)					1	
(88)m=	19.95	19.95	19.95	19.96	19.96	T 7	9.97	19.97	19.9		ŕ	19.96	19.96	19.95	1	(88)
	L					1				10 1 10.0		10.00	10.00	10.00	J	()
		tor for ga				T -	<u> </u>		<u> </u>			0.04	0.00		1	(80)
(89)m=	1	0.99	0.97	0.87	0.66		0.44	0.29	0.3	5 0.67		0.94	0.99	1	J	(89)
Me <mark>an</mark>	interna	l tempera	ature in	the rest	of dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in T	able	9 <mark>c)</mark>			1	
(90)m=	18.37	18.62	19.05	19.6	19.89	1	9.97	19.97	19.9	19.9		19.48	18.84	18.34		(90)
											fL/	A = Livin	g area ÷ (4	4) =	0.47	(91)
Mean	interna	l tempera	ature (fo	r the wh	ole dwe	llin	g) = fL	_A × T1	+ (1 -	- fLA) ×	T2				_	
(92)m=	19.06	19.27	19.64	20.11	20.38	2	20.45	20.46	20.4	6 20.4	1	20	19.45	19.02		(92)
Apply	v adjustn	nent to th	ne mear	interna	l temper	atu	ire fro	m Table	4e, v	vhere ap	prop	oriate		r	7	
(93)m=	19.06	19.27	19.64	20.11	20.38	2	20.45	20.46	20.4	6 20.4	1	20	19.45	19.02		(93)
		ting requ														
		mean inte factor fo		•		ned	at ste	ep 11 of	Table	e 9b, so i	that	Ti,m=(76)m an	d re-cale	culate	
	Jan	Feb	Mar	Apr	May	Γ	Jun	Jul	Au	ig Se	n	Oct	Nov	Dec	1	
Utilisa	L	tor for ga			Iviay		Jun	501		ig Se	ΡŢ	001	NOV	Dec]	
(94)m=	0.99	0.99	0.96	0.88	0.69		0.47	0.33	0.4	0.7		0.94	0.99	1	1	(94)
Usefu	ul gains,	hmGm,	W = (94	1 4)m x (8/	1 4)m	1							1		J	
(95)m=	511.07	588.84	681.64	760.7	697.03	4	91.44	327.36	342.	28 498.6	64	544.09	500.64	485.7]	(95)
Montl	hly aver	age exte	rnal tem	perature	e from T	abl	e 8		•					•	.	
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.4	4 14.1	1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	n intern	al tempe	erature,	Lm	1, W =	=[(39)m :	x [(93)m– (96))m]				-	
(97)m=	1294.28	1257.05	1146.73	966.95	746.76	4	97.57	328.19	344	.3 538		809.03	1068.03	1288.1		(97)
Space		g require		r	1	Wh	/mont	h = 0.02	24 x [((97)m – (<u> </u>		<u> </u>	_	1	
(98)m=	582.71	449.04	346.03	148.5	36.99	1	0	0	0	0		197.12	408.52	596.99		

								Tota	al per year	(kWh/yea	r) = Sum(9	98)15,912 =	2765.91	(98)
Space	e heatin	g requir	ement in	kWh/m²	²/year								36.83	(99)
8c. S	bace co	oling rea	quiremer	nt										
Calcu	lated fo	r June, .	July and	August.	See Tal	ble 10b		1	1		1	-	1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			1	<u> </u>		· · · · ·	T	i	1	<u> </u>	1	Table 10)		(400)
(100)m=	0 ation fac	0	0	0	0	799.38	629.3	644.75	0	0	0	0	I	(100)
(101)m=				0	0	0.96	0.98	0.97	0	0	0	0		(101)
	_	-	l Vatts) =				0.00	0.07	Ů	Ű	Ů	Ů		()
(102)m=	0	0	0	0	0	771.25	618.59	624.46	0	0	0	0		(102)
Gains	s (solar g	gains ca	lculated	for appli	cable w	eather re	ı əgion, se	e Table	10)					
(103)m=	0	0	0	0	0	1	1219.24	1	0	0	0	0		(103)
	•					dwelling,	continu	ous (kN	/h) = 0.0	24 x [(10)3)m – (102)m]:	x (41)m	
•	, í		(104)m <	<u>`</u>	i – – –									
(104)m=	0	0	0	0	0	373.73	446.88	331.47	0	0	0	0		
Cooler	fractior	-								= Sum((104) area ÷ (4	= 1) -	1152.09 0.91	(104)
			able 10b)					10-	coolea	arca - (·		0.91	
(106)m=	_	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
						-		7	Tota	$I = Sum_0$	(1.04)	=	0	(106)
Spa <mark>ce</mark>	<mark>co</mark> oling	requir <mark>e</mark> ı	<mark>men</mark> t for	month =	: (104)m	× (105)	× (106)r	n		_				
(107)m=	0	0	0	0	0	85.47	102.2	75.81	0	0	0	0		
									Total	= Sum(107)	=	263.48	(107)
Spa <mark>ce</mark>	cooling	require	ment in I	kWh/m²/	year				(107)) ÷ (4) =			3.51	(108)
9b. En	ergy rec	luiremer	nts – Col	mmunity	heating	scheme	9							
							ater heat				unity scl	heme.		
							heating		1) 0 11 11	one			0	(301)
Fractio	n of spa	ace heat	from co	mmunity	v system	1 – (30	1) =						1	(302)
	-		-							up to four	other heat	sources; ti	he latter	
			s, geotneri Commun			rom powe	r stations.	See Appe	naix C.				1	(303a)
				•			~			(2	00) v (202			
			heat fro								02) x (303	5a) =	1	(304a)
Factor	for cont	rol and	charging	method	I (Table	4c(3)) fo	or commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table '	12c) for a	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	9											kWh/yea	ı r
Annua	l space	heating	requiren	nent									2765.91	
Space	heat fro	m Com	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306)	=	2904.21	(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	require	ment fro	m secon	idary/su	oplemen	itary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating	I										I		
	_		requirem	ent									2185.68	
If DHW	/ from co	ommuni	ty schen	ne:										

Water heat from Community heat pump		(64) x (303a) x ((305) x (306) =	2294.97	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307e	e) + (310a)(310e)] =	51.99	(313)
Cooling System Energy Efficiency Ratio				4.77	(314)
Space cooling (if there is a fixed cooling	system, if not enter 0)	= (107) ÷ (314) =	=	55.29	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra		outside		204.72	(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) =	204.72	(331)
Energy for lighting (calculated in Append	dix L)			328.89	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-207.27	(333)
Electricity generated by wind turbine (Ap	opendix M) (negative qua	antity)		0	(334)
12b. CO2 Emissions – Community heat	ing scheme				_
		Energy	Emission factor	Emissions	
		kWh/year	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)		two fu <mark>els repeat (363) t</mark> o (366) for the second fue	I 132	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0 =	850.77	(367)
Electrical energy for heat distribution		(313) x	0.52	26.98	(372)
Total CO2 associated with community s	ystems	<mark>363)(</mark> 366) + (368)(372) =	877.76	(373)
CO2 associated with space heating (see	condary)	309) x	0 =	0	(374)
CO2 associated with water from immers	sion heater or instantane	ous heater (312) x	0.22 =	0	(375)
Total CO2 associated with space and w	ater heating (373) + (374) + (375) =		877.76	(376)
CO2 associated with space cooling	(315) x	0.52 =	28.69	(377)
CO2 associated with electricity for pump	os and fans within dwellir	ng (331)) x	0.52 =	106.25	(378)
CO2 associated with electricity for lighting	ng (332))) x	0.52 =	170.7	(379)
Energy saving/generation technologies Item 1	(333) to (334) as applica		0.52 × 0.01 =	-107.57	(380)
Total CO2, kg/year	sum of (376)(382) =			1075.82	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			14.33	(384)
El rating (section 14)				88	(385)

		User I	Details:						
Assessor Name: Software Name:	n: 1.0.4.7								
		Property	Address:	9R					
Address : 1. Overall dwelling dime	nsions:								
		Δre	a(m²)		Av. Hei	iaht(m)		Volume(m ³)	
Ground floor				(1a) x	r	.05	(2a) =	410.53	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	134.6	(4)] [J
Dwelling volume				(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	410.53	(5)
2. Ventilation rate:									
		econdary	other		total			m ³ per hour	
Number of chimneys	heating h	eating +	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0 +	0	」	0	x 2	20 =	0](⁶ 0)
Number of intermittent fa		L	0		0	x ^	10 =	0	_(00) _(7a)
Number of passive vents						× ⁄	10 =	-](^{, ,} , , , , , , , , , , , , , , , , ,
·					0		40 =	0	
Number of flueless gas fi					0			o anges per hou	(7c) ur
Infiltration due to chimne				ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in t	peen carried out or is intende he dwelling (ns)	a, proceed to (17),	otherwise c	onunue no	0111 (9) 10 (10)	[0	(9)
Additional infiltration	, , , , , , , , , , , , , , , , , , ,					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber f	rame or 0.35 fo	or masonr	y constr	uction		İ	0	(11)
•• •	resent, use the value correspondence	oonding to the grea	ter wall area	a (after					-
deducting areas of openii If suspended wooden f	ngs); if equal user 0.35 floor, enter 0.2 (unseale	ed) or 0.1 (seal	ed). else	enter 0				0	(12)
If no draught lobby, en								0	(13)
• ·	s and doors draught sti	ripped						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)
	q50, expressed in cub	•	•	•	etre of e	nvelope	area	3	(17)
If based on air permeabil	•							0.15	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has	been done or a de	gree air per	meability	is being us	sed	I	0	
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			2	(19) (20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed						I		
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	

Adjusted infiltra	tion rate	(allowi	ng for sh	nelter an	d wind s	peed) =	: (21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effect		-	ate for ti	he appli	cable cas	se					1	0.5	(23a)
If exhaust air hea			ndix N. (2	3b) = (23a	a) × Fmv (e	auation (N5)) . othe	rwise (23b	o) = (23a)			0.5 0.5	(23a)
If balanced with									()			72.25	(23b) (23c)
a) If balanced		-	-	-					2h)m + ('	23h) y [1 – (23c)		(230)
(24a)m= 0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29	. 100]	(24a)
b) If balanced	d mechar	nical ve	ntilation	without	heat rec	overy (u MV) (24b	m = (2)	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole ho	ouse extra	act ven	tilation c	or positiv	ve input v	entilati	on from c	outside					
if (22b)m	< 0.5 × ((23b), tl	hen (24c	c) = (23b); otherw	vise (24	-c) = (22t	o) m + 0	.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural v if (22b)m									0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air o	change ra	ate - en	ter (24a) or (24t	o) or (24c	c) or (24	ld) in boy	x (25)					
(25)m= 0.3	0.3	0.29	0.28	0.28	0.26	0.26	0.26	0.27	0.28	0.28	0.29		(25)
3. Heat losses	and hea	at loss n	paramete	er:									
3. Heat losses	and hea Gross		oaramete Openin		Net Are	ea	U-valu	ue	AXU		k-value))	AXk
ELEMENT	Gross area (I	5		gs	Net Are	n²	W/m2	к	A X U (W/ł	<)	k-value kJ/m²·ł		A X k kJ/K
	Gross area (I	5	Openin	gs		n²		к		<)			
ELEMENT	Gross area (i 1	5	Openin	gs	A ,m	n² x1	W/m2	2K 0.04] =	(VV/ł	<)			kJ/K
ELEMENT Windows Type	Gross area (i 1 2	5	Openin	gs	A ,m 5.49	n ² x1	W/m2 /[1/(1.4)+	0.04] = 0.04] =	(W/ł 7.28	<)			kJ/K (27)
ELEMENT Windows Type Windows Type	Gross area (1 1 2 3	5	Openin	gs	A ,m 5.49 17.39		W/m2 /[1/(1.4)+ /[1/(1.4)+	2K 0.04] = 0.04] = 0.04] =	(W/ł 7.28 23.05	<)			kJ/K (27) (27)
ELEMENT Windows Type Windows Type Windows Type	Gross area (1 1 2 3	5	Openin	gs	A ,m 5.49 17.39 4.58	n ² x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	<pre>K 0.04] = 0.04] = 0.04] = 0.04] =</pre>	(W/ł 7.28 23.05 6.07	<)			kJ/K (27) (27) (27)
ELEMENT Windows Type Windows Type Windows Type	Gross area (1 1 2 3	5	Openin	gs	A ,n 5.49 17.39 4.58 21.96	n ² x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	<pre>K 0.04] = 0.04] = 0.04] = 0.04] =</pre>	(W/ł 7.28 23.05 6.07 29.11	<)			kJ/K (27) (27) (27) (27)
ELEMENT Windows Type Windows Type Windows Type Rooflights	Gross area (n 1 2 3 4	5	Openin m	gs 2	A ,m 5.49 17.39 4.58 21.96 9	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 /(1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	<pre>K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =</pre>	(W/ł 7.28 23.05 6.07 29.11 12.6				kJ/K (27) (27) (27) (27) (27b)
ELEMENT Windows Type Windows Type Windows Type Rooflights Walls Type1	Gross area (n 1 2 3 4 4	5	Openin m	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 	K 0.04] 0.04] 0.04] 0.04] 0.04] 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = =	(W/ł 7.28 23.05 6.07 29.11 12.6 7.99				kJ/K (27) (27) (27) (27b) (29)
ELEMENT Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2	Gross area (n 1 2 3 4 4 4 44.4 17.2	5	Openin m 0 17.35	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.18 1.4	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27				kJ/K (27) (27) (27) (27) (27b) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3	Gross area (n 1 2 3 4 4 4 4 4 4 4 4 4 4 2 3.8	5	Openin m 0 17.38 21.96	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /(1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.18 1.4	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/k 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58				kJ/K (27) (27) (27) (27) (27b) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4	Gross area (n 1 2 3 4 4 4 4 4 4 4 4 4 4 2 3.8 15.9	5	Openin m 0 17.39 21.96	gs 2 9	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /(1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.18 1.4 0.16	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = <td>(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49</td> <td></td> <td></td> <td></td> <td>kJ/K (27) (27) (27) (27b) (29) (29) (29) (29)</td>	(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5	Gross area (n 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	5	Openin m 0 17.35 21.96 0 0	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /(1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4)]+ /[1/(1.4)]+ /[1/(1.4)]+	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =	(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type4 Walls Type5 Walls Type6	Gross area (n 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 3 8 15.9 22.9 4.5	s m²)	Openin m 0 17.39 21.90 0 0 4.58	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9 -0.08	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 1.4 0.16 0.18 1.4	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1	(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11				kJ/K (27) (27) (27) (27b) (29) (29) (29) (29) (29) (29)
ELEMENT Windows Type Windows Type Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Walls Type3 Walls Type3 Walls Type5 Walls Type6 Walls Type7	Gross area (n 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	s m ²)	Openin m 0 17.39 21.96 0 0 4.58 16.47	gs 2	A ,m 5.49 17.39 4.58 21.96 9 44.4 -0.19 1.84 15.9 22.9 -0.08 0.03	n ² x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 /(1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 1.4 0.16 0.18 1.4 1.4	K 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = <td>(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11 0.04</td> <td></td> <td></td> <td></td> <td>kJ/K (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29</td>	(W// 7.28 23.05 6.07 29.11 12.6 7.99 -0.27 2.58 2.49 4.12 -0.11 0.04				kJ/K (27) (27) (27) (27) (29) (29) (29) (29) (29) (29) (29) (29

* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions

Fabric heat loss, $W/K = S (A \times U)$	(26)(30) + (32) =	123.93
Heat capacity Cm = S(A x k)	((28)(30) + (32) + (32a)(32e) =	0
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicative Value: Medium	250

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

(33) (34) (35)

can be ι	ised inste	ad of a de	tailed calc	ulation.										
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix I	K						41.97	(36)
if details	of therma	al bridging	are not kr	own (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss								165.9	(37)			
Ventila	tion hea	at loss ca	alculated	monthl	ý	_	_		(38)m	= 0.33 × (25)m x (5)	_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	40.82	40.39	39.96	37.8	37.37	35.21	35.21	34.77	36.07	37.37	38.23	39.09		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	206.72	206.29	205.85	203.69	203.26	201.1	201.1	200.67	201.97	203.26	204.13	204.99		
Average = Sum(39) 112 Heat loss parameter (HLP), W/m²K $(40)m = (39)m \div (4)$											203.59	(39)		
(40)m=	1.54	1.53	1.53	1.51	1.51	1.49	1.49	1.49	1.5	1.51	1.52	1.52		
Nhunah			l						, ,	Average =	Sum(40)1.	12 /12=	1.51	(40)
NUMD	Jan	/s in mo Feb	Mar	, 	May	lup	Jul	Δυσ	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	Apr 30	31	Jun 30	31	Aug 31	30	31	30	31		(41)
(41)11=	51	20	51	30	51	30	51	51	50	51	50	51		(41)
1 \\/c	torboo	ting one		iromonti								k\A/b/s		
4. 992	ater nea	ung ene	igy requ	irement:						_		kWh/ye	ear.	
		upancy,			(0 0000	40 (TI			040 (7			91		(42)
	A > 13. A £ 13.		+ 1.76 x	[1 - exp	(-0.0003	49 X (11	-A -13.9)2)] + 0.0	0013 x (IFA -13.	9)			
Annua	l averag	e hot wa	ater usa	ge in litre	es per da	y Vd,av	erage =	(25 x N)	+ 36		103	3.22		(43)
								to achieve	a water us	se target o	f			
not more	e that 125	litres per	person pe	r day (all w	ater use, l	not and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	113.54	109.41	105.28	101.15	97.02	92.9	92.9	97.02	101.15	105.28	109.41	113.54		_
Enerav	content of	hot water	used - ca	culated mo	onthly $= 4$.	190 x Vd.r	т х пт х Г)))))))))))))))))))			m <mark>(44)</mark> 112 = ables 1b. 1		1238.61	(44)
(45)m=	168.38	147.26	151.96	132.48	127.12	109.7	101.65	116.64	118.04	137.56	150.16	163.06		
(43)11=	100.30	147.20	131.90	132.40	127.12	109.7	101.05	110.04			m(45) ₁₁₂ =		1624.02	(45)
lf instan	taneous w	vater heati	ng at poin	of use (no	hot water	· storage),	enter 0 in	boxes (46						
(46)m=	25.26	22.09	22.79	19.87	19.07	16.45	15.25	17.5	17.71	20.63	22.52	24.46		(46)
	storage												' I	
-		. ,		• •			-	within sa	ame ves	sel		200		(47)
	•	-		nk in dw	-			. ,	ora) ont	or '0' in (47)			
	storage		not wate		iciudes i	nstantai	ieous co	ombi boil	ers) erne		47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):				2.	24		(48)
		actor fro				,	• /					.6		(49)
-				, kWh/ye	ear			(48) x (49)	=			34		(50)
				cylinder l		or is not						01		(/
				om Tabl	e 2 (kW	h/litre/da	ay)					0		(51)
	•	eating s		on 4.3									I	
		from Ta actor fro		2h								0		(52) (53)
rempe				20							'	0		(53)

	Energy lost from water storage, kWh/year Enter (50) or (54) in (55)							(47) x (51)) x (52) x (53) =		0 34		(54) (55)
	. ,	. , .		for each	month			((56)m = (55) × (41)ı	m		-		
(56)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(56)
If cylinde	er contain	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	ix H	
(57)m=	41.66	37.63	41.66	40.32	41.66	40.32	41.66	41.66	40.32	41.66	40.32	41.66		(57)
Primar	v circuit	loss (ar	nual) fro	om Table	e 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 wat	ter heatir	ng and a	cylinde	r thermo	stat)		1	
(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	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)	m
(62)m=	233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		(62)
										r contribut	ion to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)	r	1	1	I	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea											I	
(64)m=	233.3	205.91	216.89	195.32	192.05	172.53	166.58	181.57	180.87	202.49	212.99	227.99		
											r (annual)₁		2388.47	(64)
		m water	-			-				((46)m	+ (57)m]	
(65)m=	107.93	95.88	102.47	94.32	94.21	86.74	85.74	90.73	89.51	97.68	100.19	106.16		(65)
_	. ,				-	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Int	ternal ga	ains (see	e Table 5	5 and 5a):									
Metab	olic gair	is (Table									1		I	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(66)m=		145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3		(66)
0	<u> </u>	È	·	·	· ·	i	r L9a), a I				1		I	(07)
(67)m=	27.03	24.01	19.52	14.78	11.05	9.33	10.08	13.1	17.58	22.33	26.06	27.78		(67)
••		r `	r	· · ·	· · ·	r	13 or L1	, .	-	1	1		I	(00)
(68)m=	303.18	306.33	298.4	281.52	260.22	240.19	226.82	223.67	231.6	248.48	269.78	289.81		(68)
	<u> </u>	· · · · · · · · · · · · · · · · · · ·		-			or L15a)						I	(00)
(69)m=	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53	37.53		(69)
		ns gains	<u> </u>	<u> </u>					-		<u> </u>	-	I	(70)
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0		(70)
		· · · · · · · · · · · · · · · · · · ·	<u> </u>	tive valu r	r Ó N	,					1		I	
(71)m=		-116.24		-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24	-116.24		(71)
		gains (T	· · · · ·										I	
(72)m=	145.06	142.68	137.73	131	126.63	120.47	115.24	121.94	124.32	131.29	139.16	142.69		(72)
		gains =	i			r · ·	i		i .	· · ·	1)m + (72)	i	I	
(73)m=	541.86	539.6	522.24	493.89	464.48	436.58	418.73	425.31	440.1	468.69	501.59	526.86		(73)
6. So	lar gains	5:												

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

Orientatio	on:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	21.96	×	10.63	x	0.63	x	1	=	101.95	(74)
North	0.9x	0.77	x	21.96	x	20.32	x	0.63	x	1	=	194.83	(74)
North	0.9x	0.77	x	21.96	×	34.53	x	0.63	x	1	=	331.06	(74)
North	0.9x	0.77	x	21.96	×	55.46	x	0.63	x	1	=	531.77	(74)
North	0.9x	0.77	x	21.96	x	74.72	x	0.63	x	1	=	716.34	(74)
North	0.9x	0.77	x	21.96	x	79.99	x	0.63	x	1	=	766.86	(74)
North	0.9x	0.77	x	21.96	x	74.68	x	0.63	x	1	=	715.96	(74)
North	0.9x	0.77	x	21.96	x	59.25	x	0.63	x	1	=	568.03	(74)
North	0.9x	0.77	x	21.96	×	41.52	x	0.63	x	1	=	398.04	(74)
North	0.9x	0.77	x	21.96	x	24.19	x	0.63	x	1	=	231.92	(74)
North	0.9x	0.77	x	21.96	×	13.12	x	0.63	x	1	=	125.77	(74)
North	0.9x	0.77	x	21.96	×	8.86	x	0.63	x	1	=	84.99	(74)
East	0.9x	3	x	5.49	x	19.64	x	0.63	x	1	=	141.23	(76)
East	0.9x	3	x	5.49	×	38.42	x	0.63	x	1	=	276.27	(76)
East	0.9x	3	x	5.49	×	63.27	x	0.63	x	1	=	454.97	(76)
East	0.9x	3	x	5.49	×	92.28	х	0.63	x	1	=	663.55	(76)
East	0.9x	3	x	5.49	x	113.09	x	0.63	x	1	=	813.21	(76)
East	0.9x	3	x	5.49	x	115.77	×	0.63	x	1	=	8 <mark>32.46</mark>	(76)
East	0.9x	3	x	5.49	x	110.22	x	0.63	x	1	=	7 <mark>92.54</mark>	(76)
East	0.9x	3	x	5.49	x	94.68	х	0.63	x	1	=	6 <mark>80.78</mark>	(76)
East	0.9x	3	x	5.49	x	73.59	×	0.63	x	1	=	5 <mark>29.15</mark>	(76)
East	0.9x	3	×	5.49	x	45.59	x	0.63	x	1	=	3 <mark>27.82</mark>	(76)
East	0.9x	3	x	5.49	×	24.49	x	0.63	x	1	=	176.09	(76)
East	0.9x	3	x	5.49	x	16.15	x	0.63	x	1	=	116.14	(76)
South	0.9x	0.77	x	17.39	×	46.75	x	0.63	x	1	=	354.96	(78)
South	0.9x	0.77	x	17.39	x	76.57	x	0.63	x	1	=	581.33	(78)
South	0.9x	0.77	x	17.39	×	97.53	x	0.63	x	1	=	740.51	(78)
South	0.9x	0.77	x	17.39	x	110.23	x	0.63	x	1	=	836.93	(78)
South	0.9x	0.77	x	17.39	×	114.87	x	0.63	x	1	=	872.14	(78)
South	0.9x	0.77	x	17.39	×	110.55	x	0.63	x	1	=	839.31	(78)
South	0.9x	0.77	x	17.39	×	108.01	x	0.63	x	1	=	820.06	(78)
South	0.9x	0.77	x	17.39	×	104.89	x	0.63	x	1	=	796.39	(78)
South	0.9x	0.77	x	17.39	x	101.89	x	0.63	x	1	=	773.55	(78)
South	0.9x	0.77	x	17.39	×	82.59	x	0.63	x	1	=	627.01	(78)
South	0.9x	0.77	x	17.39	×	55.42	x	0.63	x	1	=	420.74	(78)
South	0.9x	0.77	x	17.39	×	40.4	x	0.63	x	1	=	306.71	(78)
West	0.9x	0.77	x	4.58	×	19.64	x	0.63	x	1	=	39.27	(80)
West	0.9x		x	4.58	×	38.42	x	0.63	x	1	=	76.82	(80)
West	0.9x	0.77	x	4.58	x	63.27	x	0.63	x	1	=	126.52	(80)

	г		_		-		-		-				_
West	0.9x	0.77	×	4.58	×	92.28	×	0.63	×	1	=	184.52	(80)
West	0.9x	0.77	x	4.58	x	113.09	×	0.63	×	1	=	226.14	(80)
West	0.9x	0.77	x	4.58	x	115.77	x	0.63	×	1	=	231.49	(80)
West	0.9x	0.77	x	4.58	x	110.22	x	0.63	×	1	=	220.39	(80)
West	0.9x	0.77	x	4.58	x	94.68	x	0.63	x	1	=	189.31	(80)
West	0.9x	0.77	x	4.58	x	73.59	x	0.63	x	1	=	147.15	(80)
West	0.9x	0.77	x	4.58	x	45.59	x	0.63	×	1	=	91.16	(80)
West	0.9x	0.77	x	4.58	x	24.49	x	0.63	×	1	=	48.97	(80)
West	0.9x	0.77	x	4.58	x	16.15	x	0.63	x	1	=	32.3	(80)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	26	x	0.63	x	0.9	=	119.41	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	54	x	0.63	×	0.9	=	248.01	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	96	x	0.63	×	0.9	=	440.9	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	150	x	0.63	×	0.9	=	688.9	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	192	x	0.63	×	0.9	=	881.8	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	200	x	0.63	x	0.9	=	918.54	(82)
Roofligh	nts <mark>0.9x</mark>	1	×	9	- x	189	x	0.63	×	0.9	=	868.02	(82)
Roofligh	nts <mark>0.9x</mark>	1	x	9	x	157	x	0.63	×	0.9	=	721.05	(82)
Roofligh	nts 0.9x	1	x	9	X	115	x	0.63	x	0.9	=	528.16	(82)
Roofligh	nts <mark>0.9x</mark>	1	×	9	Ţ x	66	x	0.63	x	0.9	=	303.12	(82)
Roofligh	nts <mark>0.9x</mark>	1	×	9	x	33	×	0.63	x	0.9	= =	151.56	(82)
Roofligh	nts <mark>0.9x</mark>	1	×	9	j x	21	x	0.63	x	0.9	=	96.45	(82)
			7						_				
Solar g	ains in	watts, calc	ulated	for each mor	nth		(83)m	= Sum(74)m	. <mark>(8</mark> 2)m				
(83)m=	756.81	1377.25 20	93.96	2905.68 3509.	62 3	588.67 3416.97	2955	5.56 2376.05	1581.0	2 923.13	636.58		(83)
Total g	ains – i	nternal and	solar	(84)m = (73)	m + (83)m , watts							
(84)m=	1298.68	1916.86 2	616.2	3399.57 3974	.1 40	025.25 3835.7	3380).87 2816.15	2049.7	1 1424.72	1163.45		(84)
7. Me	an inter	nal temper	ature (heating seas	on)								
Temp	erature	during hea	ting p	eriods in the l	iving	area from Tal	ble 9,	Th1 (°C)				21	(85)
Utilisa	ation fac	tor for gain	s for li	iving area, h1	,m (s	ee Table 9a)]
	Jan	Feb	Mar	Apr Ma	iy	Jun Jul	A	ug Sep	Oct	Nov	Dec		
(86)m=	0.99	0.95	0.85	0.66 0.46	3	0.32 0.23	0.2	.7 0.48	0.81	0.97	0.99		(86)
Mean	interna	l temperati	ure in l	iving area T1	(follo	w steps 3 to 7	7 in T	able 9c)					
(87)m=	19.59	· · ·	20.5	20.85 20.9	<u>`</u>	20.99 21	2	<u> </u>	20.71	20.05	19.5		(87)
Tomp	oroturo		ting n	oriodo in roat		velling from Ta							
(88)m=	19.66	<u> </u>	9.67	19.68 19.6		19.69 19.69	19.	<u> </u>	19.68	19.68	19.67		(88)
								10.00	10.00	10.00	10.07		(00)
		<u> </u>			<u> </u>	,m (see Table	r Ó						(00)
(89)m=	0.98	0.94	0.81	0.6 0.4		0.25 0.16	0.2	2 0.39	0.76	0.96	0.99		(89)
Mean	-	l temperatu	ire in t			T2 (follow ste	eps 3	to 7 in Table	e 9c)			1	
(90)m=	17.85	18.47 1	9.11	19.54 19.6	6 ′	9.69 19.69	19.	69 19.67	19.4	18.52	17.74		(90)
		ļ								ving area ÷ (4			(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m=	18.66	19.2	19.77	20.15	20.27	20.3	20.31	20.31	20.28	20.02	19.24	18.57		(92)
Apply	adjustn	nent to tl	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate			I	
(93)m=	18.66	19.2	19.77	20.15	20.27	20.3	20.31	20.31	20.28	20.02	19.24	18.57		(93)
8. Spa	ace hea	ting requ	uirement											
Set Ti	to the r	mean int	ernal te	mperatui	re obtair	ned at ste	ep 11 of	Table 9t	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	1:										
(94)m=	0.98	0.93	0.82	0.62	0.43	0.28	0.19	0.23	0.43	0.77	0.95	0.99		(94)
Usefu	l gains,	hmGm	W = (9	4)m x (84	4)m									
(95)m=	1271.83	1782.79	2139.72	2117.66	1707.52	1141.95	744.45	782.35	1223.23	1586.75	1356.25	1146.77		(95)
Month	ly 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	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	-			
(97)m=	2969.3	2949.41	2730.83	2292.17	1742.29	1146.73	745.18	783.84	1248.7	1913.76	2477.67	2944.97		(97)
Space	e heatin	g require	ement fo	r each n	honth, k	Wh/mont	:h = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	1262.92	783.97	439.78	125.65	25.87	0	0	0	0	243.29	807.43	1337.86		
				-		-		Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	5026.77	(98)
Space	heatin	a require	ement in	kWh/m ²	/vear								37.35	(99)
		-			/your								01.00	
		oling rec							\ \					
Calcu				August.					0			D		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
						· · · ·					-	able 10)		(100)
(100)m=	0	0	0	0	0	1890.38	1488.17	1525.11	0	0	0	0		(100)
		tor for lo												(101)
(101) <mark>m=</mark>	0	0	0	0	0	0.99	0.9 <mark>9</mark>	0.99	0	0	0	0		(101)
1		· ·	,	(100)m x	, ,	1							I	(400)
(102)m=	0	0	0	0	0	1862.16		1505.88	0	0	0	0		(102)
				for appli		1	-					-	I	(400)
(103)m=	0	0	0	0	0	4655.22			0	0	0	0		(103)
				r month, : 3 × (98		dwelling,	continuo	ous (kW	(h) = 0.0	24 x [(10	03)m – (102)m]:	x (41)m	
set (1 (104)m=	04)11110		0	0	0	2011.01	2204 25	1807.13	0	0	0	0		
(104)11=	0	0	0	0	0	2011.01	2204.33	1007.13	-		-		0000.40	(104)
Cooled	fraction	-								= Sum(104) area ÷ (4	= 1) _	6022.48 0.91	(104)
		' actor (Ta	able 10b)					10-	cooleu	alea ÷ (-	•) -	0.91	(100)
(106)m=	0		0	0	0	0.25	0.25	0.25	0	0	0	0		
()	Ū	Ŭ	, j	Ů	Ŭ	0.20	0.20	0.20		= Sum(-	=	0	(106)
Space	coolina	requirer	nent for	month =	(104)m	× (105)	x (106)r	n	Total	– Sum	1 ₆₀₆ -7)	-	0	(100)
(107)m=	0	0	0	0	0	455.69	499.5	409.49	0	0	0	0		
	-	_	_	-	_				Total	= Sum(107)	=	1364.68	(107)
Space	ممطلعة	roquine	nont : 1	11/h/m2/							- 0 M O ⁴			4
-	-			«Wh/m²/y					(107)) ÷ (4) =			10.14	(108)
				mmunity	- The second second second second second sec									
				ting, spa condary/							unity scł	neme.	0	(301)

Fraction of space heat from community system $1 - (301) =$		1	(302)
The community scheme may obtain heat from several sources. The procedure al includes boilers, heat pumps, geothermal and waste heat from power stations. Se		ne latter	_
Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for commun	nity heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	n [1.05	(306)
Space heating Annual space heating requirement		kWh/year 5026.77	1
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	5278.11	(307a)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary syste	m (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement		2388.47]
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2507.9	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] =	77.86	(313)
Cooling System Energy Efficiency Ratio		4.77	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	286.37	(315)
Electricity for pumps and fans within dwelling (Table 4f):			- 1
mechanical ventilation - balanced, extract or positive input from c	putside	462.78	(330a)
warm air heating system fans pump for solar water heating		0	(330b) (330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	462.78] (331)
Energy for lighting (calculated in Appendix L)		477.34] (332)
Electricity generated by PVs (Appendix M) (negative quantity)		-362.72] (333)
Electricity generated by wind turbine (Appendix M) (negative qua	ntity)	0	(334)
12b. CO2 Emissions – Community heating scheme			J
	Energy Emission factor kWh/year kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using	two fuels repeat (363) to (366) for the second fuel	132	(367a)
CO2 associated with heat source 1 [(307b)+(3	s10b)] x 100 ÷ (367b) x 0 =	1274.07	(367)
Electrical energy for heat distribution	313) x 0.52 =	40.41	(372)
Total CO2 associated with community systems (3	863)(366) + (368)(372) =	1314.48	(373)
CO2 associated with space heating (secondary) (3	309) x 0 =	0	(374)
CO2 associated with water from immersion heater or instantaneous	ous heater (312) x 0.22 =	0	(375)
Total CO2 associated with space and water heating (3	373) + (374) + (375) =	1314.48	(376)

(315) x

(332))) x

CO2 associated with space cooling

CO2 associated with electricity for pumps and fans within dwelling (331)) x

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

 $(383) \div (4) =$

CO2 associated with electricity for lighting

Energy saving/generation technologies (333) to (334) as applicable Item 1

Total CO2, kg/year Dwelling CO2 Emission Rate El rating (section 14)

	0.52	=	148.62	(377)
ĸ	0.52	=	240.18	(378)
	0.52	=	247.74	(379)
				_
(0.52 × 0.0	01 =	-188.25	(380)
			1762.78	(383)
			13.1	(384)
		Г	86.85	(385)



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