Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 30 November 2021 at 16:39:44*

Proiect Information:

Assessed By: David Barsted (STRO032333) Building Type: End-terrace House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference: New Project

Plot Reference: House 1

Address: 9 Cheyne Avenue, London, TW2 6AN

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.53 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

11.82 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 49.6 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.23 (max. 0.30) 0.23 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.16 (max. 0.25) 0.16 (max. 0.70) OK Roof 0.11 (max. 0.20) 0.11 (max. 0.35) OK Openings 1.32 (max. 2.00) 1.60 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Database: (rev 485, product index 017507):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Worcester Model: Greenstar Model qualifier: 30i ErP

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	TTZC by plumbing and	electrical services	ОК
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with	low-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (Thames valle	ey):	Slight	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: North West		9.14m²	
Windows facing: South East		15.33m²	
Ventilation rate:		8.00	
Blinds/curtains:		None	
10 Key features			
Roofs U-value		0.11 W/m²K	-
Party Walls U-value		0 W/m²K	
		•	

Photovoltaic array

Thermal Bridge Report

Property Details: House 1

Address: 9 Cheyne Avenue, London, TW2 6AN

Located in: England Region: Thames valley

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0732

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Type
Sill	0.04	9.68	E3	[A]
Jamb	0.05	31.7	E4	[A]
Ground floor (normal)	0.16	16.77	E5	[A]
Intermediate floor within a dwelling	0.07	16.77	E6	[A]
Eaves (insulation at ceiling level)	0.06	16.77	E10	[A]
Corner (normal)	0.09	10.48	E16	[A]
Party wall between dwellings	0.06	10.48	E18	[A]
Other lintels (including other steel lintels)	0.3	14.38	E2	[A]
Corner (inverted internal area greater than external area)	-0.09	10.48	E17	[A]

Predicted Energy Assessment

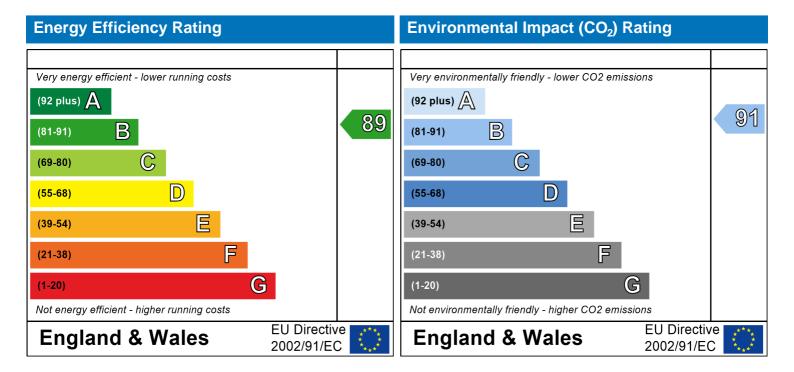


9 Cheyne Avenue London TW2 6AN Dwelling type:
Date of assessment:
Produced by:
Total floor area:

End-terrace House 30 November 2021 David Barsted 74 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: House 1

Address: 9 Cheyne Avenue, London, TW2 6AN

Located in: England Region: Thames valley

UPRN:

Date of assessment:

Date of certificate:

30 November 2021

30 November 2021

Assessment type: New dwelling design stage

Transaction type:

Tenure type:

Related party disclosure:

Thermal Mass Parameter:

New dwelling

Unknown

No related party

Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 485

Property description:

Dwelling type: House
Detachment: End-terrace
Year Completed: 2021

Floor Location: Floor area:

Floor 0 37 m^2 2.5 m Floor 1 37 m^2 2.7 m

Living area: 15 m² (fraction 0.197)

Front of dwelling faces: North West

Opening types:

Name: Source: Type: Glazing: Argon: Frame: Front Door Manufacturer Solid Windows NW SAP 2012 Windows double-glazed Yes PVC-U Windows SE SAP 2012 Windows PVC-U double-glazed Yes

Storey height:

Name: Frame Factor: g-value: U-value: Area: No. of Openings: Gap: Front Door mm 0.7 0.85 1.6 1.89 Windows NW 0.76 9.14 16mm or more 0.7 1.3 1 Windows SE 16mm or more 0.7 0.76 1.3 15.33 1

Location: Orient: Width: Height: Name: Type-Name: External Facade Front Door North West 0 Windows NW External Facade North West 0 0 Windows SE External Facade South East 0 0

Overshading: Average or unknown

Opaque Elements:

Туре:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Карра:
External Element	<u>'S</u>						
External Facade	87.88	26.36	61.52	0.23	0	False	N/A
Ceiling	36.64	0	36.64	0.12	0.5		N/A
Ground Floor	36.4			0.16			N/A
Internal Element	<u>S</u>						
Party Elements							
Party Wall	38.93						N/A

Thermal bridges:

SAP Input

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0732
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	Length	Psi-value		
[Approved]	9.68	0.04	E3	Sill
[Approved]	31.7	0.05	E4	Jamb
[Approved]	16.77	0.16	E5	Ground floor (normal)
[Approved]	16.77	0.07	E6	Intermediate floor within a dwelling
[Approved]	16.77	0.06	E10	Eaves (insulation at ceiling level)
[Approved]	10.48	0.09	E16	Corner (normal)
[Approved]	10.48	0.06	E18	Party wall between dwellings
[Approved]	14.38	0.3	E2	Other lintels (including other steel lintels)
[Approved]	10.48	-0.09	E17	Corner (inverted internal area greater than external area)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys:0Number of open flues:0Number of fans:3Number of passive stacks:0Number of sides sheltered:1Pressure test:5

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 485, product index 017507) Efficiency: Winter 86.6 % Summer: 90.5

Brand name: Worcester Model: Greenstar Model qualifier: 30i ErP (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature<=45°C

Boiler interlock: Yes Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%
Terrain type: Dense urban
EPC language: English

SAP Input

Wind turbine: No

Photovoltaics: <u>Photovoltaic 1</u>

Installed Peak power: 1.1 Tilt of collector: 30°

Overshading: None or very little Collector Orientation: South East

Assess Zero Carbon Home: No

		User Details:	_			
Assessor Name:	David Barsted Stroma FSAP 2012	Stroma Nu			032333	
Software Name:	Stroma FSAP 2012	Software V Property Address: House		versio	n: 1.0.5.50	
Address :	9 Cheyne Avenue, Londo	· · · · · ·	3C 1			
Overall dwelling dime	•	,				
		Area(m²)	Av. Height(r	n)	Volume(m³))
Ground floor		37 (1a)	2.5	(2a) =	92.5	(3a)
First floor		37 (1b)	2.7	(2b) =	99.9	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	.(1n) 74 (4)				
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e)-	+(3n) =	192.4	(5)
2. Ventilation rate:						
	main second heating heating		total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
					_	
				,	anges per ho	_
•	ys, flues and fans = (6a)+(6b een carried out or is intended, pro		30 s from (0) to (16)	÷ (5) =	0.16	(8)
Number of storeys in the	•	ceed to (17), otherwise continu	e Irom (9) to (16)		0	(9)
Additional infiltration	g (,			(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	e or 0.35 for masonry con	struction		0	(11)
if both types of wall are pa deducting areas of openir	resent, use the value correspondings): if equal user 0.35	ng to the greater wall area (after	r	'		_
=	floor, enter 0.2 (unsealed) o	r 0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught strippe	d			0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =	•	0	(16)
•	q50, expressed in cubic me		metre of envelo	pe area	5	(17)
·	ity value, then $(18) = [(17) \div 20]$				0.41	(18)
	s if a pressurisation test has been	done or a degree air permeabi	lity is being used	ı		-
Number of sides sheltere Shelter factor	ed	(20) = 1 - [0.075	x (19)] =		1 0.00	(19)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$			0.92	(20)
Infiltration rate modified for	-	(21) = (10) x (20)			0.38	(21)
Jan Feb	Mar Apr May Ju	n Jul Aug Se	p Oct No	v Dec		
l l	1 ' 1 ' 1	n Jul Aug Se	P OU NO	v Dec		
Monthly average wind sp	eeu IIOIII Table /			<u> </u>	I	

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	o (allowi	na for ok	oltor on	d wind a	nood) –	(21a) v	(22a)m	•	•	•	•	
0.48	0.47	e (allowi	0.41	0.4	0.36	0.36	0.35	0.38	0.4	0.42	0.44	1	
Calculate effe	ctive air	change i	l '	• • •			0.00	0.00	0.1	0.12	0.11]	
If mechanic	al ventila	ation:										0	(23a)
If exhaust air h		0		, ,	, ,	. ,	,, .	`) = (23a)			0	(23b)
If balanced wit		-	-	_								0	(23c)
a) If balance	1	1	i		·	- ` ` 	- ^ `	í `	 		```	÷ 100]	(5.4.)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	1		i		i	· · · · ·	· · ·	 	- 	'	ı	1	(5.41)
(24b)m = 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h				•					E (00k	. \			
(24c)m = 0	$\frac{11 < 0.5 \times}{0}$	(23b), t	nen (240	(230) = (230)	o); otner	wise (24)	C) = (221)	0) m + 0.	5 × (231	0	0	1	(24c)
			<u> </u>		<u> </u>				0			J	(240)
d) If natural if (22b)r		on or wh en (24d)							0.5]				
(24d)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(24d)
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in box	x (25)					
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(25)
						1	1					1	
3 Heat losse	es and he	at loss r	naramet	⊃r·									
3. Heat losse	es and he Gros area	SS	oarameto Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/ 3.024				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 1.89 9.14 15.33	m ² x x 1/2	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	2K = [- 0.04] = [3.024 11.29 18.94				kJ/K (26) (27) (27)
Doors Windows Type Windows Type	Gros area e 1 e 2	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+		3.024 11.29 18.94 5.824				kJ/K (26) (27) (27) (28)
Doors Windows Type Windows Type Floor	Gros area e 1 e 2	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23	2K = [- 0.04] = [- 0.04] = [= = [(W/l 3.024 11.29 18.94 5.824 14.15				kJ/K (26) (27) (27) (28) (29)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52 36.64	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [= = [3.024 11.29 18.94 5.824				kJ/K (26) (27) (27) (28) (29) (30)
Doors Windows Type Windows Type Floor Walls Roof Total area of e	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [- 0.04] = [= = [= = [(W/) 3.024 11.29 18.94 5.824 14.15				(26) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 87.8 36.6 elements	38 (m²) 38 34 34 34 35, m²	Openin m 26.3 0	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [- 0.04] = [- = [- = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15	K)	kJ/m²-	k	kJ/K (26) (27) (27) (28) (29) (30)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are	Gros area e 1 e 2 87.8 36.6 elements d roof winders on both	38 (m²) 34 34 34 35, m² ows, use e	26.30 0 effective winternal wall	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x1/2 x x x1/2 x x1	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15	k)	kJ/m²-	K	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both	38 (m²) 38 34 34 34 35, m² 36 36 37 38 38 38 38 39 39 39 39 39 39 39 39 39 39 39 39 39	26.30 0 effective winternal wall	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x1/2 x x x1/2 x x1	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	$ \begin{array}{ccc} 2K & = & \\ $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0	k)	kJ/m²-	1 3.2 57.38	(26) (27) (27) (28) (29) (30) (31) (32)
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ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments wh	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 offective with ternal wall U) P = Cm = tails of the	gs 6 ndow U-ve ls and pan	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculations	x1/3 x1/3 x x1/4 x x 2 x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & & \\ & = & & \\ & =$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	1 3.2 57.38	(26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both ss, W/K: Cm = S(s parame sments whe ead of a de	ss (m²) 38 34 34 35, m² 364 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 366 367 368 368 368 368 368 368	26.30 26.30 0 offective winternal wall U) P = Cm - tails of the culation.	gs ndow U-va ls and pan - TFA) ir construct	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul titions	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & & \\ & = & & \\ & =$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	(26) (27) (27) (28) (29) (30) (31) (32) (33) (66) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments whe ead of a de es: S (L	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs andow U-vals and pan TFA) ir constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & & \\ & = & & \\ & =$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (33) (6) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg	Gros area e 1 e 2 87.8 36.6 elements d roof winde as on both ss, W/K: Cm = S(s parame sments whe ead of a de es: S (L al bridging	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs andow U-vals and pan TFA) ir constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	2K = [- 0.04] = [(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	(26) (27) (27) (28) (29) (30) (31) (32) (33) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments whe ead of a de es: S (L al bridging eat loss	SS (m²) 38 34 34 34 35 36 37 38 38 38 39 30 30 30 30 30 30 30 30 30	26.30 26.30 0 effective with ternal walk to the tails of the tails	gs indow U-value TFA) in construction using Ap = 0.05 x (3)	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 10)+0.04] at tive Value at values of the value of the value at the value	K)	paragraph(32e) =	57.38 10750.0 250	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (36)

(00) 00 00	00.74	00.40	07.40	00.00	05.70	05.70	05.50	00.00	00.00	07.44	07.00		(20)
(38)m= 39.02	38.74	38.46	37.16	36.92	35.79	35.79	35.58	36.22	36.92	37.41	37.93		(38)
Heat transfer of			400.00	400.00	404.05	404.05	404.74	· · ·	= (37) + (3		407.00		
(39)m= 108.18	107.9	107.62	106.32	106.08	104.95	104.95	104.74	105.38	106.08	106.57	107.09	106.32	(39)
Heat loss para	meter (H	HLP), W/	′m²K				-		= (39)m ÷	Sum(39) ₁ . · (4)	12 / 12=	100.32	(00)
(40)m= 1.46	1.46	1.45	1.44	1.43	1.42	1.42	1.42	1.42	1.43	1.44	1.45		_
Number of dev	a in ma	ath (Tabl	lo 1o\					,	Average =	Sum(40) ₁	12 /12=	1.44	(40)
Number of day 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)
(11)111													, ,
4. Water heat	ing once	av roqui	romont:								kWh/ye	or:	
4. Walei Heal	ing ener	gy requi	rement.								KVVII/ye	:ai.	
Assumed occu			[4	/ o oooo	140 /TF	- A A O O	\0\1 . 0 ()040 /T	FFA 40		34		(42)
if TFA > 13.9 if TFA £ 13.9	•	+ 1.76 X	[1 - exp	(-0.0003	349 X (1F	·A -13.9)2)] + 0.0)U13 X (1	IFA -13.	.9)			
Annual averag	e hot wa										.76		(43)
Reduce the annua not more that 125							to achieve	a water us	se target o	f			
						,		0		l			
Jan Hot water usage ir	Feb	Mar day for ea	Apr	May $Vd.m = fac$	Jun	Jul Fable 1c x	Aug (43)	Sep	Oct	Nov	Dec		
	•				1		. /	07.06	04.55	05.14	00.72		
(44)m= 98.73	95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14 m(44) ₁₁₂ =	98.73	1077.07	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D	OTm / 3600			· /	L	1077.07	(++)
(45)m= 146.42	128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8		
					<u> </u>		ı		Γotal = Su	m(45) ₁₁₂ =	=	1412.21	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46	to (61)					
(46)m= 21.96	19.21	19.82	17.28	16.58	14.31	13.26	15.21	15.4	17.94	19.59	21.27		(46)
Water storage		inaludin	.a opv o	olor or M	MUDE	otorogo	within oc	ma vaa	o o l				(47)
Storage volum	, ,					_		iiie ves	sei		0		(47)
If community h Otherwise if no	_			•			, ,	ers) ente	er '0' in <i>(</i>	47)			
Water storage			. (-					,	,	,			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro		•	•				(48) x (49)	=			0		(50)
b) If manufaction Hot water stora			-										(51)
If community h	_			C Z (KVV)	ii/iiti C /ua	y <i>)</i>					0		(31)
Volume factor	•										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) in (5	55)									0		(55)
	loss cal	culated f	or each	month			((56)m = (55) × (41)r	m				
Water storage													
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
	0	-						-			_	x H	(56)

Primary circuit loss (annual) from Table 3				0		(58)
Primary circuit loss calculated for each month (5	$59)$ m = $(58) \div 36$	5 × (41)m			•	
(modified by factor from Table H5 if there is so	olar water heatir	ng and a cylinde	r thermostat)			
(59)m= 0 0 0 0 0	0 0	0 0	0 0	0		(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)	m				
(61)m= 36.4 32.86 36.36 35.17 36.32	35.13 36.29	36.31 35.15	36.35 35.2	36.39		(61)
Total heat required for water heating calculated	for each month	(62)m = 0.85 × ((45)m + (46)m	+ (57)m +	(59)m + (61)m	
(62)m= 182.81 160.92 168.51 150.37 146.86	130.52 124.68	137.74 137.79	155.97 165.7	- ` ´ 		(62)
Solar DHW input calculated using Appendix G or Appendix I	H (negative quantity) (enter '0' if no sola	r contribution to w	ater heating)	l	
(add additional lines if FGHRS and/or WWHRS				0,		
(63)m= 0 0 0 0 0	0 0	0 0	0 0	0		(63)
Output from water heater		<u> </u>	ļ l		l	
(64)m= 182.81 160.92 168.51 150.37 146.86	130.52 124.68	137.74 137.79	155.97 165.7	3 178.19		
	ļ .		L Lannua ater heater (annua		1840.15	(64)
Heat gains from water heating, kWh/month 0.25	5 ′ [0 85 x (45)m				1	1
(65)m= 57.78 50.79 53.03 47.1 45.84	40.5 38.46	42.8 42.92	48.86 52.22			(65)
	ļ .	ļ	ļ	ļ	l soctions	()
include (57)m in calculation of (65)m only if cy	/iinder is in the c	weiling or not w	ater is from co	minumity r	leating	
5. Internal gains (see Table 5 and 5a):						
Metabolic gains (Table 5), Watts					1	
Jan Feb Mar Apr May	Jun Jul	Aug Sep	Oct Nov	_		(00)
(66)m= 140.35 140.35 140.35 140.35 140.35	140.35 140.35	140.35 140.35	140.35 140.3	5 140.35		(66)
Lighting gains (calculated in Appendix L, equation	 				•	
(67)m= 46.01 40.87 33.24 25.16 18.81	15.88 17.16	22.3 29.93	38.01 44.36	47.29		(67)
Appliances gains (calculated in Appendix L, equ	ation L13 or L1	3a), also see Ta	ble 5			
(68)m= 308.13 311.33 303.27 286.12 264.46	244.11 230.52	227.32 235.38	252.53 274.1	3 294.53		(68)
Cooking gains (calculated in Appendix L, equation	on L15 or L15a)	, also see Table	5			
(69)m= 51.37 51.37 51.37 51.37 51.37	51.37 51.37	51.37 51.37	51.37 51.37	51.37		(69)
Pumps and fans gains (Table 5a)						
(70)m= 3 3 3 3 3	3 3	3 3	3 3	3		(70)
Losses e.g. evaporation (negative values) (Table	e 5)	•	•	•	•	
(71)m= -93.57 -93.57 -93.57 -93.57	-93.57 -93.57	-93.57 -93.57	-93.57 -93.57	7 -93.57		(71)
Water heating gains (Table 5)		l				
(72)m= 77.67 75.59 71.27 65.41 61.61	56.25 51.7	57.53 59.61	65.67 72.52	75.6		(72)
Total internal gains =	(66)m + (67)m	+ (68)m + (69)m +	<u>l </u>	 72)m		
(73)m= 532.97 528.94 508.94 477.85 446.04	417.4 400.53	408.31 426.08	457.37 492.2	<u> </u>		(73)
6. Solar gains:	111.1	100.01	107.07	3 010.00		()
Solar gains are calculated using solar flux from Table 6a a	and associated equa	tions to convert to th	e applicable orien	tation.		
Orientation: Access Factor Area	Flux	g_	FF		Gains	
Table 6d m ²	Table 6a	Table 6b	Table 6		(W)	
Southeast 0.9x 0.77 x 15.33 >	× 36.79	x 0.76	x 0.7	=	207.95	(77)
Couthood a	× 62.67	x 0.76	x 0.7		354.22](77)
0.77	02.07	0.76	^		SS4.ZZ	1(,,,

					_		,		_				_
Southeast 0.9x	0.77	X	15.	33	×	85.75	X	0.76	X	0.7	=	484.66	(77)
Southeast 0.9x	0.77	X	15.	33	x	106.25	X	0.76	X	0.7	=	600.51	(77)
Southeast 0.9x	0.77	X	15.	33	x	119.01	X	0.76	X	0.7	=	672.62	(77)
Southeast _{0.9x}	0.77	X	15.	33	Х	118.15	X	0.76	X	0.7	=	667.76	(77)
Southeast _{0.9x}	0.77	X	15.	33	x	113.91	X	0.76	X	0.7	=	643.79	(77)
Southeast 0.9x	0.77	X	15.	33	x	104.39	X	0.76	X	0.7	=	589.99	(77)
Southeast 0.9x	0.77	X	15.	33	x	92.85	X	0.76	X	0.7	=	524.78	(77)
Southeast 0.9x	0.77	X	15.	33	x	69.27	X	0.76	X	0.7	=	391.49	(77)
Southeast 0.9x	0.77	X	15.	33	x	44.07	X	0.76	X	0.7	=	249.08	(77)
Southeast 0.9x	0.77	X	15.	33	x	31.49	X	0.76	X	0.7	=	177.96	(77)
Northwest 0.9x	0.77	X	9.1	4	x	11.28	X	0.76	X	0.7	=	38.02	(81)
Northwest 0.9x	0.77	X	9.1	4	x	22.97	X	0.76	х	0.7	=	77.39	(81)
Northwest 0.9x	0.77	X	9.1	4	x	41.38	X	0.76	X	0.7	=	139.43	(81)
Northwest 0.9x	0.77	X	9.1	4	х	67.96	X	0.76	X	0.7	=	228.99	(81)
Northwest 0.9x	0.77	X	9.1	4	x	91.35	X	0.76	X	0.7	=	307.81	(81)
Northwest 0.9x	0.77	X	9.1	4	х	97.38	X	0.76	X	0.7	=	328.16	(81)
Northwest 0.9x	0.77	X	9.1	4	х	91.1	X	0.76	X	0.7	=	306.98	(81)
Northwest 0.9x	0.77	X	9.1	4	х	72.63	X	0.76	X	0.7	=	244.73	(81)
Northwest 0.9x	0.77	x	9.1	4	х	50.42	X	0.76	x	0.7	=	169.9	(81)
Northwest 0.9x	0.77	X	9.1	4	х	28.07	X	0.76	X	0.7	=	94.58	(81)
Northwest 0.9x	0.77	X	9.1	4	х	14.2	X	0.76	X	0.7	=	47.84	(81)
Northwest 0.9x	0.77	x	9.1	4	х	9.21	X	0.76	x	0.7	=	31.05	(81)
Solar gains in	watts, ca	lculated	for eac	h month			(83)m	n = Sum(74)m	(82)m			•	
(83)m= 245.97	431.61	624.09	829.5	980.43	995.		834	.72 694.68	486.0	296.92	209.01		(83)
Total gains – i					<u> </u>	<u> </u>					1	ı	
(84)m= 778.94	960.55	1133.03	1307.35	1426.47	1413	1351.31	1243	3.04 1120.76	943.4	789.14	727.59		(84)
7. Mean inter	rnal temp	erature	(heating	season)								
Temperature	during h	eating p	eriods ir	the livi	ng ar	ea from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	ctor for ga	ains for I	iving are	ea, h1,m	(see	Table 9a)						•	
Jan	Feb	Mar	Apr	May	Ju	ın Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.91	8.0	0.64	0.4	6 0.34	0.3	0.61	0.87	0.97	0.99		(86)
Mean interna	al tempera	ature in l	living are	ea T1 (fo	ollow	steps 3 to 7	7 in T	able 9c)					
(87)m= 19.75	20.02	20.37	20.71	20.91	20.9	98 21	20.	99 20.95	20.65	20.13	19.7		(87)
Temperature	durina h	eating p	eriods ir	rest of	dwell	lina from Ta	able 9	9. Th2 (°C)		-		•	
(88)m= 19.72	19.72	19.72	19.74	19.74	19.7	<u> </u>	19.		19.74	19.73	19.73		(88)
Utilisation fac	etor for a	aine for r	est of d	welling	h2 m	(see Table	۱۹۵۱	1		1	Į.	ı	
(89)m= 0.98	0.95	0.89	0.75	0.57	0.3	<u>` </u>	0.2	28 0.51	0.82	0.95	0.98		(89)
	ļ ļ	ļ			<u> </u>			<u> </u>	<u>. </u>	1		I	. ,
Mean interna (90)m= 18.12	18.51	18.99	the rest	of dwelli	ng 12 19.7	<u> </u>	eps 3		19.39	18.68	18.06		(90)
(90)m= 18.12	10.01	10.33	19.44	19.00	19.7	19.75	1 19.			ving area ÷ (0.2	(90)
										ig aroa ₹ (., –	U.Z	(31)

N. 4		/5_			l:\ £	. A T4	. /4 41	۸) To					
Mean intern (92)m= 18.45		19.26	r the wn	19.92	19.99	LA × 11	+ (1 – fL 20	19.96	19.65	18.98	18.39		(92)
Apply adjust		ļ					L			10.90	10.39		(32)
(93)m= 18.3	18.67	19.11	19.55	19.77	19.84	19.85	19.85	19.81	19.5	18.83	18.24		(93)
8. Space he				10.11	10.01	10.00	10.00	10.01	10.0	10.00	10.21		()
Set Ti to the the utilisatio	mean in	ternal ter	nperatur		ed at ste	ep 11 of	Table 9l	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		
Utilisation fa					• • • • • • • • • • • • • • • • • • • •		79	Oop	•••				
(94)m= 0.97	0.94	0.87	0.75	0.57	0.38	0.25	0.29	0.52	0.81	0.94	0.97		(94)
Useful gains	s, hmGm	, W = (94	1)m x (84	4)m									
(95)m= 754.47	7 899.11	988.44	975.8	813.34	544.02	340.49	360.21	581.2	763.19	743.07	709.35		(95)
Monthly ave	rage 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)
Heat loss ra						- ` 	- ` 	` ′	-				
(97)m= 1514.7		1357.66		855.7	550.07	341.21	361.53	601.8	943.83	1249.89	1503.35		(97)
Space heati	 									·	i		
(98)m= 565.65	393.92	274.7	112.69	31.51	0	0	0	0	134.39	364.9	590.74		-
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2468.51	(98)
Space heati	ng requir	ement in	kWh/m²	/year								33.36	(99)
9a. Energy re	quiremer	nts – Indi	vidual h	eating sy	/stems i	ncluding	micro-C	HP)					
Space heat	ing:												
Fraction of s	space hea	at from s	econdary	y/supple	mentary	system						0	(201)
Fraction of s	nace has												
	space nea	at from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of t	•		•	` '				$-(201) =$ $02) \times [1 -$	(203)] =			1	(202)
	otal heati	ng from	main sys	stem 1					(203)] =				╡
Fraction of t	otal heati main spa	ng from ace heat	main sys	stem 1 em 1	g system				(203)] =			1	(204)
Fraction of t Efficiency of	otal heati main spa	ng from ace heat	main sys	stem 1 em 1	g system Jun				(203)] =	Nov	Dec	1 92.9	(204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan Space heati	otal heati main spa seconda Feb ng requir	ng from ace heat ary/supple Mar ement (c	main systemany systementary Apr alculated	etem 1 em 1 y heating May d above)	Jun	ո, %	(204) = (2	02) × [1 –	Oct	Nov	Dec	92.9 0	(204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan	otal heati main spa seconda Feb ng requir	ng from ace heat ry/supple Mar	main sysing systementary	stem 1 em 1 y heating May	Jun	ո, %	(204) = (2	02) × [1 –		Nov 364.9	Dec 590.74	92.9 0	(204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan Space heati	otal heati main spa seconda Feb ng require 3 393.92	ng from ace heat ary/supple Mar ement (c	main systementary Apr Alculated	em 1 y heating May d above)	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct			92.9 0	(204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan Space heati	otal heati main spa seconda Feb ng requir 3 393.92	ng from ace heat ary/supple Mar ement (c	main systementary Apr Alculated	em 1 y heating May d above)	Jun	n, % Jul	(204) = (2 Aug 0	02) × [1 - Sep 0	Oct 134.39	364.9 392.79	590.74	92.9 0	(204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9	otal heati main spa seconda Feb ng requir 3 393.92 8)m x (20	ng from ace heat ary/supple Mar ement (c 274.7	main system system alculated 112.69 00 ÷ (20	stem 1 em 1 y heating May d above) 31.51	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 - Sep 0	Oct 134.39	364.9 392.79	590.74	92.9 0	(204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88	otal heati f main spa f seconda Feb ng requir 5 393.92 8)m x (20 8 424.02	mg from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7	main systementary Apr alculated 112.69 00 ÷ (20 121.3	m 1 y heating May d above) 31.51 6) 33.92	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 - Sep 0	Oct 134.39	364.9 392.79	590.74	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.86 Space heati = {[(98)m x (2)	otal heati main sparse seconda Feb ng require 3 393.92 8)m x (20 3 424.02 ng fuel (s	ng from ace heat ary/supple Mar ement (c 274.7)4)] } x 1 295.7 econdar 00 ÷ (20	main systementary Apr alculated 112.69 00 ÷ (20 121.3	month	Jun 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 (kWh/yea	Oct 134.39 144.67 ar) =Sum(2	364.9 392.79 211) _{15,1012}	590.74 635.89	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88	otal heati f main spa f seconda Feb ng requir 5 393.92 8)m x (20 8 424.02	mg from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7	main systementary Apr alculated 112.69 00 ÷ (20 121.3	m 1 y heating May d above) 31.51 6) 33.92	Jun 0	n, % Jul o	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 134.39 144.67 ar) =Sum(2)	364.9 392.79 211) _{15,1012}	590.74 635.89	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m=0	otal heati main spa seconda Feb ng requir 3 393.92 8)m x (20 8 424.02 ng fuel (second) } x 1	ng from ace heat ary/supple Mar ement (c 274.7)4)] } x 1 295.7 econdar 00 ÷ (20	main systementary Apr alculated 112.69 00 ÷ (20 121.3	month	Jun 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 134.39 144.67 ar) =Sum(2	364.9 392.79 211) _{15,1012}	590.74 635.89	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.86} Space heati = {[(98)m x (2) (215)m=0 Water heating	otal heati f main spa f seconda Feb ng requir 5 393.92 8)m x (20 8 424.02 ng fuel (s 201)] } x 1	ng from ace heat ary/supple Mar ement (c 274.7)4)] } x 1 295.7 econdar 00 ÷ (20 0	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0	stem 1 em 1 y heating May d above) 31.51 e6) 33.92 month	Jun 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 134.39 144.67 ar) =Sum(2)	364.9 392.79 211) _{15,1012}	590.74 635.89	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heating	otal heati main spa seconda Feb ng requir 3 393.92 8)m x (20 3 424.02 ng fuel (s 201)] } x 1 0 ng water hea	mg from ace heat ary/supple Mar ement (c 274.7)4)] } x 1 295.7 econdar 00 ÷ (20 0	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0	month stem 1 y heating May d above) 31.51 6)	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 1 (kWh/yea	Oct 134.39 144.67 ar) = Sum(2	364.9 392.79 211) _{15,1012} 0 215) _{15,1012}	590.74 635.89 = 0	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from y 182.81	otal heati main spa seconda Feb ng requir 3 393.92 8)m x (20 8 424.02 ng fuel (second)] } x 1 0 ng water heati	ng from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7 econdar 00 ÷ (20 0 ter (calc 168.51	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0	stem 1 em 1 y heating May d above) 31.51 e6) 33.92 month	Jun 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 134.39 144.67 ar) =Sum(2)	364.9 392.79 211) _{15,1012}	590.74 635.89	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 182.81 Efficiency of v	otal heati main spa seconda Feb ng requir 3 393.92 8)m x (20 8 424.02 ng fuel (second) x 1 0 ng water heati	mg from ace heat ary/supple Mar ement (c 274.7 295.7 econdar 00 ÷ (20 0 ter (calc 168.51 ater	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8) 0	month o o o o o o o o o o o o o	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 134.39 144.67 ar) =Sum(2 0 155.97	364.9 392.79 211) _{15,1012} 0 215) _{15,1012}	590.74 635.89 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 182.81 Efficiency of v (217)m= 89.52	otal heati f main spa f seconda Feb ng requir 5 393.92 8)m x (20 8 424.02 ng fuel (s 201)] } x 1 0 ng water heati	ng from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7 econdar 00 ÷ (20 0 0 ter (calc 168.51 ater 88.98	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0 ulated al 150.37	month stem 1 y heating May d above) 31.51 6)	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 1 (kWh/yea	Oct 134.39 144.67 ar) = Sum(2	364.9 392.79 211) _{15,1012} 0 215) _{15,1012}	590.74 635.89 = 0	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 182.81 Efficiency of v	otal heati f main sparses secondar f seconda	ng from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7 econdar 00 ÷ (20 0 tter (calc 168.51 ater 88.98 kWh/mc	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0 ulated al 150.37 88.23 onth	month o o o o o o o o o o o o o	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 134.39 144.67 ar) =Sum(2 0 155.97	364.9 392.79 211) _{15,1012} 0 215) _{15,1012}	590.74 635.89 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88} Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 182.81 Efficiency of v (217)m= 89.52 Fuel for wate	otal heating otal heating requires 393.92 8) m x (20 and seconds) 393.92 8) m x (20 and seconds) 393.92 ng fuel (seconds) 3 at 160.92 water heating seconds ar heating seconds are seconds ar	ng from ace heat ary/supple Mar ement (c 274.7 04)] } x 1 295.7 econdar 00 ÷ (20 0 tter (calc 168.51 ater 88.98 kWh/mc	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh/8 0 ulated al 150.37 88.23 onth	month o o o o o o o o o o o o o	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 134.39 144.67 ar) =Sum(2 0 155.97	364.9 392.79 211) _{15,1012} 0 215) _{15,1012}	590.74 635.89 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 565.65 (211)m = {[(9) 608.88 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 182.81 Efficiency of v (217)m= 89.52 Fuel for wate (219)m = (64)	otal heating otal heating requires 393.92 8) m x (20 and seconds) 393.92 8) m x (20 and seconds) 393.92 ng fuel (seconds) 3 at 160.92 water heating seconds ar heating seconds are seconds ar	mg from ace heat ary/supple Mar ement (c 274.7) 4)] } x 1 295.7 econdar 00 ÷ (20 0 ter (calc 168.51 ater 88.98 kWh/mg 0 ÷ (217)	main systementary Apr alculated 112.69 00 ÷ (20 121.3 y), kWh// 8) 0 ulated alculated alculate	stem 1 em 1 y heating May d above) 31.51 e6) 33.92 month 0 boove) 146.86	Jun 0 0 0 130.52 86.6	o 0 124.68 86.6	O Tota 137.74 86.6	02) × [1 – Sep 0 0 I (kWh/yea 137.79 86.6	Oct 134.39 144.67 0 ar) =Sum(2 155.97 88.36	364.9 392.79 211) _{15,1012} 0 215) _{15,1012} 165.78	590.74 635.89 0 178.19	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)

Annual totals		kWh/year	kWh/year
Space heating fuel used, main system 1		-	2657.16
Water heating fuel used			2086.55
Electricity for pumps, fans and electric keep-hot	t		
central heating pump:		30	(230c)
boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			325.04 (232)
Electricity generated by PVs			-905.68 (233)
Total delivered energy for all uses (211)(221)	+ (231) + (232)(237b) =		4238.07 (338)
10a. Fuel costs - individual heating systems:			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	3.48 x 0.01 =	92.47 (240)
Space heating - main system 2	(213) x	0 x 0.01 =	0 (241)
Space heating - secondary	(215) x	13.19 x 0.01 =	0 (242)
Water heating cost (other fuel)	(219)	3.48 × 0.01 =	72.61 (247)
Pumps, fans and electric keep-hot	(231)	13.19 × 0.01 =	9.89 (249)
(if off-peak tariff, list each of (230a) to (230g) se Energy for lighting	eparately as applicable and app (232)	oly fuel price according to	
Additional standing charges (Table 12)			120 (251)
	one of (233) to (235) x)	13.19 x 0.01 =	-119.46 (252)
Appendix Q items: repeat lines (253) and (254)	as needed		
	247) + (250)(254) =		218.39 (255)
11a. SAP rating - individual heating systems			
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF) [(255) x	$(256)] \div [(4) + 45.0] =$		0.77 (257)
SAP rating (Section 12)			89.25 (258)
12a. CO2 emissions – Individual heating syste	ems including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	573.95 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	450.69 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1024.64 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)

Electricity for lighting	(232) x	0.519	=	168.69 (268)
Energy saving/generation technologies Item 1		0.519	=	-470.05 (269)
Total CO2, kg/year		sum of (265)(271) =		762.21 (272)
CO2 emissions per m²		(272) ÷ (4) =		10.3 (273)
El rating (section 14)				91 (274)
13a. Primary Energy				
	Energy kWh/year	Primary factor		P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	=	3241.74 (261)

Electricity for pumps, fans and electric keep-hot Electricity for lighting

Energy saving/generation technologies

'Total Primary Energy

Item 1

Space heating (secondary)

Energy for water heating

Space and water heating

Primary energy kWh/m²/year

Energy kWh/year	Primary factor		P. Energy kWh/year	
(211) x	1.22	=	3241.74	(261)
(215) x	3.07	=	0	(263)
(219) x	1.22	=	2545.59	(264)
(261) + (262) + (263) + (264) =			5787.33	(265)
(231) x	3.07	=	230.25	(267)
(232) x	0	=	997.86	(268)
	3.07	=	-2780.45	(269)
sum	n of (265)(271) =		4234.99	(272)
(27)	2) ÷ (4) =		57.23	(273)

		User Details:			
			0.70	200000	
Assessor Name:	David Barsted Stroma FSAP 2012	Stroma Nun		O032333 on: 1.0.5.50	
Software Name:	Stroma FSAP 2012	Software Ve Property Address: House		on. 1.0.5.50	
Address :	9 Cheyne Avenue, Lond	• •	; I		
Overall dwelling dime	•	ion, 1112 o/ a1			
		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		37 (1a) x	2.5 (2a) =	92.5	(3a)
First floor		37 (1b) x	2.7 (2b) =	99.9	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 74 (4)			
Dwelling volume		(3a)+(3l	(3c)+(3c)+(3d)+(3e)+(3n) =	192.4	(5)
2. Ventilation rate:					
	main secor heating heati		total	m³ per hour	
Number of chimneys	0 + 0		0 x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0 ((6b)
Number of intermittent fa	ns		3 x 10 =	30	(7a)
Number of passive vents		Ī	0 x 10 =	0 ((7b)
Number of flueless gas fi	res	Ī	0 x 40 =	0 ((7c)
		-		hanges nor hour	
Inditantian due to object	us flues and force (60) (6	h) ((70) ((7h) ((70) —		hanges per hour	
•	ys, flues and fans = (6a)+(6 neen carried out or is intended, pr	oceed to (17), otherwise continue to	\div (5) =	0.16	(8)
Number of storeys in the	•	((-) (-)	0	(9)
Additional infiltration			[(9)-1]x0.1 =	0 ((10)
Structural infiltration: 0	.25 for steel or timber fram	e or 0.35 for masonry const	ruction	0 ((11)
if both types of wall are pa deducting areas of openia		ing to the greater wall area (after			
		or 0.1 (sealed), else enter 0		0 ((12)
If no draught lobby, en	ter 0.05, else enter 0				(13)
Percentage of windows	s and doors draught strippe	ed		0 ((14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	0 ((15)
Infiltration rate		(8) + (10) + (11) + ((12) + (13) + (15) =	0 ((16)
Air permeability value,	q50, expressed in cubic m	etres per hour per square n	netre of envelope area	5 ((17)
If based on air permeabil	ity value, then $(18) = [(17) \div 2]$	20]+(8), otherwise (18) = (16)		0.41	(18)
Air permeability value applie		n done or a degree air permeability	is being used		
	ed		(40)]		(19)
Number of sides sheltere		(00) 4 [0.075 /			
Shelter factor		$(20) = 1 - [0.075 \times (20)]$		0.92	(20)
Shelter factor Infiltration rate incorporat	-	(20) = 1 - [0.075 x ((21) = (18) x (20) =			(20) (21)
Shelter factor Infiltration rate incorporat Infiltration rate modified f	or monthly wind speed	(21) = (18) x (20) =		0.38	
Shelter factor Infiltration rate incorporat	or monthly wind speed Mar Apr May J			0.38	

3.4

3.4

3.2

3.3

3.1

3.1

3.3

3.2

3.6

(22)m=

3.9

3.6

Wind Factor (22a)m = (22)m ÷ 4 (22a)m = 0.98
0.37
0.37
Calculate effective air change rate for the applicable case If mechanical ventilation: If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)) , otherwise (23b) = (23a) If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)) , otherwise (23b) = (23a) If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0 (23c) a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) x [1 - (23c) ÷ 100] (24a)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a) If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100] (24a)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) x [1 - (23c) ÷ 100] (24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
c) If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) (24c)m=
if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b) m + 0.5 \times (23b)$ (24c)m = 0
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] (24d)m= 0.57
(24d)m= 0.57
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) (25)m= 0.57 0.56 0.56 0.55 0.55 0.55 0.55 0.55 0.54 0.54 0.55 0.55 0.56 (25) 3. Heat losses and heat loss parameter: ELEMENT Gross Openings Net Area A,m² U-value W/m2K A X U k-value kJ/m²-K kJ/K
(25)m= 0.57 0.56 0.56 0.55 0.55 0.55 0.55 0.54 0.54 0.55 0.55
3. Heat losses and heat loss parameter: ELEMENT Gross Openings Net Area U-value A X U k-value A X k area (m²) m² A ,m² W/m2K (W/K) kJ/m²-K kJ/K
ELEMENT Gross area (m²) Openings m² Net Area
area (m²)
Doors $1.89 \times 1.6 = 3.024$ (26)
<u> </u>
Windows Type 1 $9.14 x1/[1/(1.3) + 0.04] = 11.29$ (27)
Windows Type 2 15.33 $x^{1/[1/(1.3) + 0.04]} = 18.94$ (27)
Floor 36.4 × 0.16 = 5.824 (28)
Walls 87.88 26.36 61.52 x 0.23 = 14.15 (29)
Roof 36.64 0 36.64 × 0.11 = 4.15 (30)
Total area of elements, m ² 160.92 (31)
Party wall 38.93 x 0 = 0 (32)
* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2
** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 57.38 (33)
Heat are as it. One O(A 1)
Heat capacity $Cm = S(A \times K)$ $((28)(30) + (32) + (32a)(32e) = 10750.06 $ Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m²K Indicative Value: Medium 250 (35)
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f
can be used instead of a detailed calculation.
Thermal bridges: S (L x Y) calculated using Appendix K 11.78 (36)
if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss (33) + (36) = 69.16 (37)
Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$

												ı	
(38)m= 36	35.37	35.37	34.98	34.98	34.61	34.79	34.43	34.43	34.79	34.61	35.37		(38)
Heat transfer	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 105.16	104.53	104.53	104.14	104.14	103.77	103.95	103.6	103.6	103.95	103.77	104.53		_
Heat loss para	ameter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ (4)	12 /12=	104.14	(39)
(40)m= 1.42	1.41	1.41	1.41	1.41	1.4	1.4	1.4	1.4	1.4	1.4	1.41		_
Number of de	ıc in moı	oth (Tabl	lo 1a)					,	Average =	Sum(40) ₁	12 /12=	1.41	(40)
Number of day Jan	Feb	Mar		May	Jun	Jul	Δυα	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	Apr 30	31	30	31	Aug 31	30 30	31	30	31		(41)
(41)		01	00	01		01		00	01				(11)
4 \\/_+	·										1-10/1- /		
4. Water hea	ting enei	gy requi	rement:								kWh/ye	ear:	
Assumed occ											.34		(42)
if TFA > 13. if TFA £ 13.		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
Annual average	′	ater usac	ne in litre	s per da	av Vd.av	erage =	(25 x N)	+ 36		80).76		(43)
Reduce the annu	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		7.70		(10)
not more that 125	litres per p	person per	day (all w	ater use, l	not and co	ld)						1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres per	day for ea	ach month	Vd,m = fa	ctor from T	Fable 1c x	(43)					1	
(44)m= 98.73	95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14	98.73		_
Energy content o	f hot water	used - cal	culated m	onthly – 1	100 v Vd r	n v nm v F	Tm / 3600			m(44) ₁₁₂ =		1077.07	(44)
									,		. ,		
(45)m= 146.42	128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8		
If instantaneous v	vater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		i otai = Su	m(45) ₁₁₂ =	=	1412.21	(45)
(46)m= 21.96	19.21	19.82	17.28	16.58	14.31	13.26	15.21	15.4	17.94	19.59	21.27		(46)
Water storage	I '	.0.02	20			.0.20	1 .0.2.			10.00			,
Storage volum	ne (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community I	neating a	nd no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n		hot wate	er (this in	cludes i	nstantar	eous co	mbi boil	ers) ente	er '0' in (47)			
Water storage		ا امسمام	ft-	ممامات	/1.\\//	·/da\.						1	(40)
a) If manufac				DI IS KITO	WII (KVVI	i/uay).					0		(48)
Temperature f							(40) (40)				0		(49)
Energy lost from b) If manufact		-	-		or is not		(48) x (49)	=			0		(50)
Hot water stor			•								0		(51)
If community I	_			,		• /							, ,
Volume factor											0		(52)
Temperature t	actor fro	m Table	2b								0		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or	. , .	•	_								0		(55)
Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
		_					_			_	-	ix H	(56)

Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss calculated for each month (59)m = $(58) \div 365 \times (41)$ m	
(modified by factor from Table H5 if there is solar water heating and a cy	rlinder thermostat)
(59)m= 0 0 0 0 0 0 0	0 0 0 0 (59)
Combi loss calculated for each month (61)m = (60) \div 365 × (41)m	
(61)m= 36.4 32.86 36.36 35.17 36.32 35.13 36.29 36.31 3	5.15 36.35 35.2 36.39 (61)
Total heat required for water heating calculated for each month (62)m = 0.8	$85 \times (45)$ m + (46) m + (57) m + (59) m + (61) m
	37.79 155.97 165.78 178.19 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if n	no solar contribution to water heating)
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	
(63)m= 0 0 0 0 0 0 0 0	0 0 0 0 (63)
Output from water heater	
	37.79 155.97 165.78 178.19
Output f	from water heater (annual) ₁₁₂ 1840.15 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] +	· 0.8 x [(46)m + (57)m + (59)m]
	2.92 48.86 52.22 56.25 (65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or l	
5. Internal gains (see Table 5 and 5a):	not water to from community freating
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug S	Sep Oct Nov Dec
	Sep Oct Nov Dec 40.35 140.35 140.35 140.35 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Tab	
	9.93 38.01 44.36 47.29 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also se	
` '	35.38 252.53 274.18 294.53 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see	
(69)m= 51.37 51.37 51.37 51.37 51.37 51.37 51.37 51.37 5	1.37 51.37 51.37 (69)
Pumps and fans gains (Table 5a)	
(70)m= 3 3 3 3 3 3 3 3	3 3 3 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57	93.57 -93.57 -93.57 (71)
Water heating gains (Table 5)	
(72)m= 77.67 75.59 71.27 65.41 61.61 56.25 51.7 57.53 5	9.61 65.67 72.52 75.6 (72)
Total internal gains = $(66)m + (67)m + (68)m + (68)m$	9)m + (70)m + (71)m + (72)m
(73)m= 532.97 528.94 508.94 477.85 446.04 417.4 400.53 408.31 42	26.08 457.37 492.23 518.58 (73)
6. Solar gains:	
Solar gains are calculated using solar flux from Table 6a and associated equations to conve	ert to the applicable orientation.
Orientation: Access Factor Area Flux g_	
Table 6d m² Table 6a Tabl	le 6b Table 6c (W)
Southeast 0.9x 0.77 x 15.33 x 41.61 x 0.	76 × 0.7 = 235.16 (77)
Southeast 0.9x 0.77 x 15.33 x 60.61 x 0.	76 × 0.7 = 342.54 (77)

о и <u>Г</u>					-			1			_				
Southeast 0.9x	0.77	X	15.	33	x [84	.44	Х		0.76	×	0.7	=	477.24	(77)
Southeast 0.9x	0.77	X	15.	33	x	107	7.38	X		0.76	X	0.7	=	606.86	(77)
Southeast _{0.9x}	0.77	X	15.	33	x	117	7.92	X		0.76	×	0.7	=	666.45	(77)
Southeast _{0.9x}	0.77	X	15.	33	X	125	5.66	X		0.76	X	0.7		710.22	(77)
Southeast 0.9x	0.77	X	15.	33	x	120	0.27	X		0.76	X	0.7	=	679.76	(77)
Southeast 0.9x	0.77	X	15.	33	x	110	0.91	X		0.76	X	0.7	=	626.86	(77)
Southeast 0.9x	0.77	X	15.	33	x	98	3.3	x		0.76	X	0.7	=	555.58	(77)
Southeast 0.9x	0.77	X	15.	33	x	73	.85	X		0.76	X	0.7	=	417.38	(77)
Southeast 0.9x	0.77	X	15.	33	x	48	.14	x		0.76	X	0.7	=	272.05	(77)
Southeast 0.9x	0.77	X	15.	33	x	34	.14	X		0.76	x	0.7	=	192.92	(77)
Northwest _{0.9x}	0.77	X	9.1	4	x	13	.35	х		0.76	x	0.7		44.97	(81)
Northwest _{0.9x}	0.77	X	9.1	4	х	23	.37	x		0.76	×	0.7		78.75	(81)
Northwest 0.9x	0.77	X	9.1	4	x [42	97	x		0.76	x	0.7	=	144.79	(81)
Northwest 0.9x	0.77	X	9.1	4	x	71	.92	х		0.76	x	0.7		242.35	(81)
Northwest 0.9x	0.77	X	9.1	4	x	93	.84	х		0.76	X	0.7		316.22	(81)
Northwest 0.9x	0.77	x	9.1	4	x [106	6.82	x		0.76	= x	0.7	_ =	359.94	(81)
Northwest _{0.9x}	0.77	x	9.1	4	x	99	.44	X		0.76	×	0.7	=	335.07	(81)
Northwest 0.9x	0.77	X	9.1	4	x [80	.49	X		0.76	×	0.7	_ =	271.22	(81)
Northwest 0.9x	0.77	x	9.1	4	x [56	5.2	х		0.76	= x	0.7		189.36	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x	31	.55	х		0.76	= x	0.7		106.3	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x [.25	X		0.76	= x	0.7		54.76	(81)
Northwest _{0.9x}	0.77	X	9.1		x [.42	X		0.76	╡ ×	0.7			(81)
L					L						_				
Solar gains in	watts, ca	lculated	for eacl	h month				(83)m	ı = Su	m(74)m	(82)n	1			
(83)m= 280.13	421.3	622.04	849.22	982.67	107	70.16	1014.83	898	.08	744.94	523.6	8 326.82	228.05		(83)
Total gains – i	nternal a	nd solar	(84)m =	= (73)m ·	+ (8	33)m ,	watts					•		_	
(84)m= 813.1	950.24	1130.98	1327.07	1428.71	148	87.56	1415.36	130	6.4	1171.02	981.0	5 819.05	746.63		(84)
7. Mean inter	rnal temp	erature	(heating	season)										
Temperature						area fr	om Tab	ole 9	, Th1	(°C)				21	(85)
Utilisation fac	ctor for ga	ains for I	iving are	ea, h1,m	(se	ee Tab	ole 9a)								
Jan	Feb	Mar	Apr	May	r `	Jun	Jul	Α	ug	Sep	Oc	t Nov	Dec		
(86)m= 0.97	0.95	0.88	0.73	0.53	0).31	0.19	0.2	22	0.48	0.79	0.95	0.98		(86)
Mean interna	ıl tempera	ature in I	living ar	ea T1 (fo	יחורי	w sten	s 3 to 7	in T	ahle	9c)			•	_	
(87)m= 19.99	20.19	20.54	20.83	20.96	_	21	21	2		20.98	20.8	1 20.35	19.92	7	(87)
	!	4:				 		L	╌				Į	_	
Temperature (88)m= 19.75	19.75	19.75	19.76	19.76	_	9.76	19.76	19.		2 (°C) 19.76	19.7	6 19.76	19.75	٦	(88)
	!	Į			<u> </u>				, 0	13.70	19.7	19.76	19.75		(00)
Utilisation fac	, j	1			_	<u> </u>		<u> </u>	- 1	Т		-	ı	7	(22)
(89)m= 0.96	0.94	0.85	0.68	0.45	0).23	0.1	0.1	2	0.37	0.72	0.93	0.97	_	(89)
Mean interna	al tempera	ature in t	the rest	of dwelli	ng	T2 (fol	llow ste	ps 3	to 7	in Table	e 9c)			_	
(90)m= 18.48	18.78	19.24	19.6	19.73	19	9.76	19.76	19.	76	19.76	19.5		18.4		(90)
										fl	LA = L	ving area ÷ (4) =	0.2	(91)

N/::	-14	/		ا میں امام	II:\ £I	. A T4	. /4 41	۸) T O					
Mean intern (92)m= 18.79		19.5	19.85	19.98	20.01	20.01	+ (1 – TL 20.01	A) × 12	19.84	19.28	18.71		(92)
Apply adjus										19.20	10.71		(02)
(93)m= 18.64	1	19.35	19.7	19.83	19.86	19.86	19.86	19.85	19.69	19.13	18.56		(93)
8. Space he		uirement											
Set Ti to the	mean int	ternal ter	nperatur		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				,				'					
(94)m= 0.95	0.92	0.84	0.67	0.46	0.23	0.11	0.13	0.38	0.72	0.91	0.96		(94)
Useful gains	s, hmGm	, W = (94	4)m x (84	4)m									
(95)m= 775.79	875.96	945.6	891.84	655.92	348.3	151.87	172.35	446.56	706.38	747.22	719.92		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8								
(96)m= 5.5	6	7.8	10.3	13.4	16.5	18.4	18.2	15.5	12	8.4	5.5		(96)
Heat loss ra						-` 	-``	``					(07)
` '	6 1350.18			669.99	348.82	151.88	172.38	451.15	799.02	1113.99	1365.06		(97)
Space heati	 	194.94	r each m 62.64	10.47)m] x (4 ² 68.92	1)m 264.08	479.99		
(98)m= 450.7	318.68	194.94	62.64	10.47	0	0	0 Tata	0				4050 44	7(00)
							rota	l per year	(kvvn/year) = Sum(9	8)15,912 =	1850.41	(98)
Space heati	ng require	ement in	kWh/m²	/year								25.01	(99)
9a. Energy re	equiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heat	•										1		_
Fraction of s	-		econdary	y/supple	mentary	system						0	(201)
Fraction of s	space has												=
	space nea	at from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of t	•		•	, ,				- (201) = 02) × [1 -	(203)] =			1	(202)
	otal heati	ng from	main sys	stem 1					(203)] =				╡
Fraction of t	otal heati f main spa	ng from lace heat	main sysing syste	stem 1 em 1	g system				(203)] =			1	(204)
Fraction of t	total heati f main spa f seconda	ng from lace heat	main sysing syste	stem 1 em 1	g system Jun				(203)] =	Nov	Dec	1 92.9	(204) (206) (208)
Fraction of the Efficiency of Efficiency of	total heati f main spa f seconda Feb	ng from lace heatings	main sys ing syste ementar Apr	stem 1 em 1 y heating May	Jun	ո, %	(204) = (2	02) × [1 –		Nov	Dec	92.9 0	(204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan	otal heati f main spa f seconda Feb ng require	ng from lace heatings	main sys ing syste ementar Apr	stem 1 em 1 y heating May	Jun	ո, %	(204) = (2	02) × [1 –		Nov 264.08	Dec 479.99	92.9 0	(204) (206) (208)
Fraction of the Efficiency of Efficiency of Jan Space heati	otal heati f main spa f seconda Feb ing require 318.68	ng from ace heatingly supplement (compared to 194.94	main systementary Apr Alculated 62.64	em 1 em 1 y heating May d above)	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct			92.9 0	(204) (206) (208)
Fraction of the Efficiency of Efficiency of Jan Space heati	f main spa f seconda Feb ing require 318.68	ng from ace heatingly supplement (compared to 194.94	main systementary Apr Alculated 62.64	em 1 em 1 y heating May d above)	Jun	n, % Jul	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 68.92	264.08 284.26	479.99 516.67	92.9 0	(204) (206) (208) ar
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7	f main spa f seconda Feb ing require 318.68	ng from acce heating/supplement (continued by 194.94	main systementary Apr Alculated 62.64 00 ÷ (20	stem 1 em 1 y heating May d above) 10.47	Jun) 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 -	Oct 68.92	264.08 284.26	479.99 516.67	92.9 0	(204) (206) (208) ar
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7	f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03	ng from ace heatingly supplement (continued by 194.94 left) 209.84	main systementary Apr alculated 62.64 00 ÷ (20 67.43	may heating May dabove) 10.47	Jun) 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 68.92	264.08 284.26	479.99 516.67	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9 485.14	rotal heati f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03	mg from ace heatingly/supplement (compared 194.94 pt.) 209.84	main systementary Apr alculated 62.64 00 ÷ (20 67.43	may heating May dabove) 10.47	Jun) 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 68.92	264.08 284.26	479.99 516.67	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9 485.14	rotal heati f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03	mg from ace heatingly/supplement (compared 194.94 pt.) 209.84	main systementary Apr alculated 62.64 00 ÷ (20 67.43	may heating May dabove) 10.47	Jun) 0	n, % Jul o	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012}	479.99 516.67 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9485.14485	f main spar f seconda Feb ing require 318.68 18)m x (20 4 343.03 ing fuel (s 201)] } x 1	mg from ace heating mar lement (continued of the secondary of the secondar	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/8	month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012}	479.99 516.67 =	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9] 485.14]} Space heating 485.14 Space heating 485.14 Water heating 187	rotal heati f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03 ing fuel (s 201)] } x 1 0	mg from ace heatingly/supplement (compared 194.94 and 194.94 and 199.84 are condary 00 ÷ (20 and 194.94 and 199.84 are condary 00 ÷ (20 and 199.84 are condary	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/8 0	stem 1 em 1 y heating May d above) 10.47 e6) 11.27 month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012}	479.99 516.67 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9 485.14 485.	rotal heati f main spa f seconda Feb ing require 318.68 88)m x (20 4 343.03 ing fuel (s 201)] } x 1 0 ng water hea	mg from mace heating margement (colors and m	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/ 8) 0	month stem 1 may heating May dabove) 10.47 06) 11.27	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012} 0	479.99 516.67 = 0	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(98)m x (215)m=0]} Water heating Output from the Indian	rotal heati f main spa f seconda Feb ing require 318.68 88)m x (20 4 343.03 ing fuel (second)] } x 1 0 ng water heati	mg from mace heating mace heati	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/8 0	stem 1 em 1 y heating May d above) 10.47 e6) 11.27 month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012}	479.99 516.67 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9 485.14) 485.14] Space heating 485.14 Efficiency of 585.14	rotal heati f main spa f seconda Feb ing require 318.68 18)m x (20 14 343.03 Ing fuel (second) x 1	mg from mace heating mary/supplement (continued mark) and mark the mark that the mark	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/8 0 ulated al 150.37	month o oove) 146.86	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 68.92 74.19 ar) =Sum(2 0 ar) =Sum(2	264.08 284.26 211) _{15,1012} 0 215) _{15,1012}	479.99 516.67 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(98)m x (215)m=0]} Water heating Output from the Mater of Space heating 182.81 (217)m=89.34	rotal heati f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03 ang fuel (s 201)] } x 1 0 ng water heati	mg from mace heating mace heati	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh/8 0 ulated al 150.37	month stem 1 may heating May dabove) 10.47 06) 11.27	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 68.92 74.19 ar) =Sum(2	264.08 284.26 211) _{15,1012} 0	479.99 516.67 = 0	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of the Efficiency of Efficiency of Jan Space heating 450.7 (211)m = {[(9 485.14) 485.14] Space heating 485.14 Efficiency of 585.14	rotal heati f main spa f seconda Feb ing require 318.68 8)m x (20 4 343.03 Ing fuel (s 201)] } x 1 0 ng water hea 1 160.92 water hea 89.15 In heating,	mg from ace heatingly/supplement (content of the supplement) Mar	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh// 8) 0 ulated alted a	month o oove) 146.86	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 68.92 74.19 ar) =Sum(2 0 ar) =Sum(2	264.08 284.26 211) _{15,1012} 0 215) _{15,1012}	479.99 516.67 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of the Efficiency of Efficiency of Efficiency of Space heating 450.7 (211)m = {[(9) 485.14] Space heating 485.14 Efficiency of 182.81 Efficiency of 182.81 Efficiency of 182.81 Fuel for water	r heating, total heati f main span f seconda Feb ing require 318.68 18)m x (20 14 343.03 15 343.03 16 160.92 16 160.92 17 water heating, 18 100 19 100 10 100	mg from ace heatingly/supplement (content of the supplement) Mar	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh// 8) 0 ulated alted a	month o oove) 146.86	Jun 0 0 0 130.52	o 0 124.68	O Tota 137.74 86.6	02) × [1 – Sep 0 0 I (kWh/yea 137.79 86.6	Oct 68.92 74.19 0 ar) =Sum(2 155.97 87.76	264.08 284.26 211) _{15,1012} 0 215) _{15,1012}	479.99 516.67 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of the Efficiency of Efficiency of Efficiency of Use Space heating 450.7 (211)m = {[(98)m x (26) (215)m= 0] Water heating Output from the Material (217)m= 89.34 Fuel for water (219)m = (64)	r heating, total heati f main span f seconda Feb ing require 318.68 18)m x (20 14 343.03 15 343.03 16 160.92 water heating, 160.92 water heating, 17 heating, 18 m x 100	mg from mace heating ace heating ace heating are ment (continued and mace). The mace heating are marked as a secondary of the mace heating and makes a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating as a secondary of the mace heating are marked as a secondary of the mace heating are marked as a secondary of the mace heating as a secondary of the mace heating as a secondary of the marked as a secondary of the mace heating as a secondary of	main systementary Apr alculated 62.64 00 ÷ (20 67.43 y), kWh// 8) 0 ulated al 150.37 87.71 onth m	stem 1 em 1 y heating May d above) 10.47 16) 11.27 month 0 0 00000 146.86	Jun 0 0 130.52 86.6	o 0 124.68 86.6	O Tota 137.74 86.6	02) × [1 – Sep 0 0 I (kWh/yea 137.79 86.6	Oct 68.92 74.19 0 ar) =Sum(2 155.97 87.76	264.08 284.26 211) _{15,1012} 0 215) _{15,1012} 165.78	479.99 516.67 = 0 = 178.19	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)

Space heating fuel used, main system 1 1691.83 2091.99	Annual totals		kWh/year	kWh/year
Electricity for pumps, fans and electric keep-hot central heating pump: Sao (230c) Sao (230c)	Space heating fuel used, main system	1	·	1991.83
Decirital heating pump: 30 (230c)	Water heating fuel used			2091.99
Doubler with a fan-assisted flue 45	Electricity for pumps, fans and electric	keep-hot		
Total electricity for the above, kWh/year sum of (230a)(230g) = 75	central heating pump:		30	(230c)
Electricity for lighting 325.04 329. 329.	boiler with a fan-assisted flue		45	(230e)
Electricity generated by PVs	Total electricity for the above, kWh/ye	sum of (230a	n)(230g) =	75 (231)
Total delivered energy for all uses (211)(221) + (231) + (232)(237b) =	Electricity for lighting			325.04 (232)
Fuel Fuel Costs - individual heating systems: Fuel Fuel Fuel Fuel Fuel Cost KWh/year (Table 12) Fuel Cost E/year Cable 12) Space heating - main system 1 (211) x 3.74 x 0.01 74.49 (240) (240) Space heating - main system 2 (213) x 0 x 0.01 0 (241) (241) Space heating - secondary (215) x 19.12 x 0.01 0 (242) (247)	Electricity generated by PVs			-959.19 (233)
Fuel KWMr/year Fuel Fuel Price KWMr/year (Table 12)	Total delivered energy for all uses (21	1)(221) + (231) + (232)(237b) =		3524.67 (338)
KWh/year (Table 12) E/year (Space heating - main system 1 (211) x (3.74) x 0.01 = [74.49] (240) (240) (240) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241) (240) (241)	10a. Fuel costs - individual heating s	ystems:		
Space heating - main system 2 (213) x				
Space heating - secondary (215) x	Space heating - main system 1	(211) x	3.74 × 0.01 =	74.49 (240)
Water heating cost (other fuel) (219) 3.74 x 0.01 = 78.24 (247) Pumps, fans and electric keep-hot (231) 0 x 0.01 = 14.34 (249) (if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a Energy for lighting (232) 0 x 0.01 = 62.15 (250) Additional standing charges (Table 12) 94 (251) One of (233) to (235) x) 0 x 0.01 = 0 (252) One of (233) to (235) x) 0 x 0.01 = 0 (252) One of (233) to (235) x) 0 x 0.01 = 183.4 (252) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12) 0.42 (256) Energy cost factor (ECF) (255) x (256)] ÷ [(4) + 45.0] = 0.42 (256) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year Rg CO2/kWh kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Space heating - main system 2	(213) x	0 x 0.01 =	0 (241)
Pumps, fans and electric keep-hot (231)	Space heating - secondary	(215) x	19.12 x 0.01 =	0 (242)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a Energy for lighting (232) 0 x 0.01 = 62.15 (250) Additional standing charges (Table 12) 94 (251) one of (233) to (235) x) 0 x 0.01 = 0 (252) one of (233) to (235) x) 19.12 x 0.01 = -183.4 (252) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12) 0.42 (256) Energy cost factor (ECF) ((255) x (256)) + [(4) + 45.0] = 0.66 (257) SAP rating (Section 12) 90.73 (258) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy ky Emission factor kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Water heating cost (other fuel)	(219)	3.74 × 0.01 =	78.24 (247)
Energy for lighting (232) 0 x 0.01 = 62.15 (250) Additional standing charges (Table 12) 94 (251) one of (233) to (235) x) 0 x 0.01 = 0 (252) one of (233) to (235) x) 19.12 x 0.01 = -183.4 (252) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12) 0.42 (256) Energy cost factor (ECF) (255) x (256)] ÷ [(4) + 45.0] = 0.66 (257) SAP rating (Section 12) 90.73 (258) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year kg CO2/kWh kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Pumps, fans and electric keep-hot	(231)	0 x 0.01 =	14.34 (249)
one of (233) to (235) x) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12) Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0] = SAP rating (Section 12) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year kg CO2/kWh kg CO2/kWh Space heating (main system 1) (211) x			0.04	
one of (233) to (235) x) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12) Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0] = 0.66 (257) SAP rating (Section 12) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year kg CO2/kWh kg CO2/kwh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Additional standing charges (Table 12			94 (251)
one of (233) to (235) x) Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) =		one of (233) to (235) x)	0 x 0.01 =	0 (252)
Appendix Q items: repeat lines (253) and (254) as needed Total energy cost (245)(247) + (250)(254) = 139.83 (255) 11a. SAP rating - individual heating systems Energy cost deflator (Table 12)		one of (233) to (235) x)	19.12 × 0.01 =	
11a. SAP rating - individual heating systems	Appendix Q items: repeat lines (253) a	and (254) as needed		
Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (Section 12) Energy kWh/year Energy kWh/year Space heating (main system 1) Space heating (secondary) Energy kWater heating (211) x (215) x (215) x (215) x (216) = (217) x (217) x (218) = (218) x (219) x (210) x (210) x (210) x (211) x	Total energy cost	(245)(247) + (250)(254) =		139.83 (255)
Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0] =	11a. SAP rating - individual heating s	ystems		
SAP rating (Section 12) 90.73 (258) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Energy cost deflator (Table 12)			0.42 (256)
Energy kWh/year kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =		0.66 (257)
Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	SAP rating (Section 12)			90.73 (258)
kWh/year kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 430.23 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 451.87 (264)	12a. CO2 emissions – Individual hea	ting systems including micro-CHP		
Space heating (secondary) Water heating (215) x (215) x (217) x (218) x (219) x (219) x (219) x (210) x (200)		<u> </u>		
Water heating (219) x (264)	Space heating (main system 1)	(211) x	0.216 =	430.23 (261)
(004) + (000) + (000)	Space heating (secondary)	(215) x	0.519 =	0 (263)
Space and water heating $(261) + (262) + (263) + (264) =$ 882.1 (265)	Water heating	(219) x	0.216 =	451.87 (264)
	Space and water heating	(261) + (262) + (263) + (264) =		882.1 (265)

Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	168.69 (268)
Energy saving/generation technologies Item 1		0.519 =	-497.82 (269)
Total CO2, kg/year		sum of (265)(271) =	591.91 (272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =	8 (273)
El rating (section 14)			93 (274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	2430.03 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2552.23 (264)
Space and water heating	(261) + (262) + (263) + (264) =		4982.26 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	997.86 (268)
Energy saving/generation technologies			
Item 1		3.07	-2944.7 (269)
'Total Primary Energy	sum	of (265)(271) =	3265.67 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	44.13 (273)

		User Details:				
Assessor Name:	David Barsted		Number:	STRO	RO032333	
Software Name:	Stroma FSAP 2012	Softwa	re Version:	Versio	n: 1.0.5.50	
	P	Property Address:	House 1			
Address :	9 Cheyne Avenue, London,	TW2 6AN				
1. Overall dwelling dime	nsions:					
		Area(m²)	Av. Heigl	<u>`</u>	Volume(m ³	<u>-</u>
Ground floor		37	1a) x 2.5	(2a) =	92.5	(3a)
First floor		37	(1b) x 2.7	(2b) =	99.9	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 74	(4)			
Dwelling volume			(3a)+(3b)+(3c)+(3d)+((3e)+(3n) =	192.4	(5)
2. Ventilation rate:						
	main seconda heating heating	ry other	total		m³ per hou	ır
Number of chimneys	0 + 0	+ 0	= 0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0	= 0	x 20 =	0	(6b)
Number of intermittent far	าร	_	3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fir	es		0	x 40 =	0	(7c)
1.60	(0-) (0) (7-1-(71-)-(7-)		_ ,	anges per ho	_
•	rs, flues and fans = (6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b		30 Ontinue from (9) to (16	÷ (5) =	0.16	(8)
Number of storeys in th		a to (17), out of 1100 of		, [0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame o	r 0.35 for masonry	construction	Ì	0	(11)
if both types of wall are pro deducting areas of openin	esent, use the value corresponding to gs); if equal user 0.35	o the greater wall area	(after			_
If suspended wooden fl	oor, enter 0.2 (unsealed) or 0	.1 (sealed), else	enter 0		0	(12)
If no draught lobby, ent	er 0.05, else enter 0			Ī	0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2	$x (14) \div 100] =$		0	(15)
Infiltration rate		(8) + (10) +	(11) + (12) + (13) + (15) =	0	(16)
Air permeability value,	q50, expressed in cubic metre	es per hour per so	uare metre of env	elope area	5	(17)
If based on air permeabili	ty value, then (18) = [(17) ÷ 20]+((8), otherwise $(18) = (18)$	6)]	0.41	(18)
	s if a pressurisation test has been do	ne or a degree air peri	meability is being used	1		_
Number of sides sheltered	d	(20) 4 [(0.075 v (40)1		1	(19)
Shelter factor		• • • • • • •	0.075 x (19)] =	Ĺ	0.92	(20)
Infiltration rate incorporati	_	(21) = (18)	x (20) =		0.38	(21)
Infiltration rate modified fo		1 1 . 1		,, _		
Jan Feb	Mar Apr May Jun	Jul Aug	Sep Oct	Nov Dec		
Monthly average wind spe	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Mind Factor (000	(22)	4										
Wind Factor (22a)m= 1.27	$\frac{22a)m = }{1.25}$	(22)m ÷	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
` '	ļ			<u> </u>		ļ						J	
Adjusted infilt	т —	<u> </u>				<u> </u>	`	<u> </u>			T 0.44	1	
0.48 Calculate effe	0.47 ctive air	0.46 change i	0.41 rate for t	0.4 he appli	0.36 cable ca	0.36 SE	0.35	0.38	0.4	0.42	0.44]	
If mechanic	al ventila	ation:										0	(23a)
If exhaust air h		0		, ,	,	• `	,, .	•) = (23a)			0	(23b)
If balanced wit		-	•	_								0	(23c)
a) If balance	i			 		, , , , , , , , , , , , , , , , , , , 	- ^ ` ` - 	``	<u> </u>	- 	``) ÷ 100] 1	(0.4-)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	1	1			1			``	<u> </u>	- 	Ι ,	1	(24b)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	J	(240)
c) If whole h		tract ven ≺ (23b), t		•	•				5 x (23h	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24c)
d) If natural	ventilation	on or wh	ole hous	se positiv	re input	ventilatio	on from I	oft		<u>l</u>	!	1	
if (22b)	m = 1, th	en (24d)	m = (22l	b)m othe	erwise (2	24d)m = 0	0.5 + [(2	2b)m² x	0.5]		,	-	
(24d)m = 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(24d)
Effective air			<u> </u>) or (24b	``	c) or (24	 	(25)				7	
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(25)
3. Heat losse	o and he	(]											
3. Heat 10886	es and ne	eat loss p	paramet	er:									
ELEMENT	Gros area	SS	oaramet Openin m	ıgs	Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value kJ/m²-		A X k kJ/K
	Gros	SS	Openin	ıgs		m²							
ELEMENT	Gros area	SS	Openin	ıgs	A ,r	m² x	W/m2	K = [(W/I				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	ıgs	A ,r	m ² x x1/	W/m2	0.04] = [(W/l				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	ıgs	A ,r	m ² x x1/	W/m2 1 /[1/(1.4)+	0.04] = [1.89 8.22				kJ/K (26) (27)
Doors Windows Type Windows Type	Gros area e 1	ss (m²)	Openin	gs 1 ²	A ,r 1.89 6.2	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [1.89 8.22 13.8				kJ/K (26) (27) (27)
ELEMENT Doors Windows Type Windows Type Floor	Gros area e 1 e 2	ss (m²)	Openin m	gs 1 ²	A ,r 1.89 6.2 10.41 36.4	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	eK = [0.04] = [0.04] = [= [1.89 8.22 13.8 4.732				kJ/K (26) (27) (27) (28)
Doors Windows Type Windows Type Floor Walls	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs 1 ²	A ,r 1.89 6.2 10.41 36.4 69.38	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	K	1.89 8.22 13.8 4.732 12.49				kJ/K (26) (27) (27) (28) (29)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs 1 ²	A ,r 1.89 6.2 10.41 36.4 69.38	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	K	1.89 8.22 13.8 4.732 12.49				kJ/K (26) (27) (27) (28) (29)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 87.8 36.6 elements	38 64 5, m²	Openin m 18.5	indow U-va	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	K	1.89 8.22 13.8 4.732 12.49 4.76	K)	kJ/m²-	к 	kJ/K (26) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are	Gros area e 1 e 2 87.8 36.6 elements	38 64 64 6, m ² dows, use e	Openin m 18.5 0 ffective with ternal wall	indow U-va	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/x x1/x x x1/x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13		1.89 8.22 13.8 4.732 12.49 4.76	K)	kJ/m²-	K	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both	38 64 64 6, m ² dows, use enders of interpretations of the state	Openin m 18.5 0 ffective wing ternal wall	indow U-va	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/x x1/x x x1/x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	$ \begin{array}{ccc} (1) & = & \\ (1) & = & \\ (2) & = & \\ (3) & = & \\ (4) & = $	1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] &	K)	kJ/m²-	h 3.2	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(38 34 34 35, m ² Sows, use end sides of interpretation of the sides of the sid	Openin m 18.5 0 ffective winternal wall U)	indow U-va	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions	x x1/ x1/ x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	$ \begin{array}{ccc} (1/U) & = & \\ (1/2) $	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 10 (30) + (32)	K)	kJ/m²-	h 3.2 45.89	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = So	38 54 55, m ² Sides of interpretations of inter	Openin m 18.5 0 ffective with ternal walk U) P = Cm -	indow U-valls and pan	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions	x1/x x1/x x x1/x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= [0.04] =	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] at tive Value	K)	paragraph(32e) =	h 3.2	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = Si s parame sments whe ead of a de	ss (m²) 38 34 54 5, m² dows, use end is ides of interpretation of interpretatio	Openin m 18.5 0 ffective winternal wall U) P = Cm - tails of the ulation.	indow U-valls and part	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= [0.04] =	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] at tive Value	K)	paragraph(32e) =	h 3.2 45.89	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = Se s parame sments whe ead of a de es: S (L	SS (m²) 38 34 35, m² 36 (A x k) 36 (A x k) 36 (A x k) 37 (A x k) 38 (A x k) 38 (A x k) 38 (A x k) 39 (A x k) 30 (A x k)	Openin 18.5 0 ffective winternal wall U) P = Cm - tails of the ulation. culated to	indow U-valls and para	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K pendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= [0.04] =	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] at tive Value	K)	paragraph(32e) =	h 3.2 45.89	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = Si s parame sments whe ead of a de es : S (L al bridging	SS (m²) 38 34 35, m² 36 (A x k) 36 (A x k) 36 (A x k) 37 (A x k) 38 (A x k) 38 (A x k) 38 (A x k) 39 (A x k) 30 (A x k)	Openin 18.5 0 ffective winternal wall U) P = Cm - tails of the ulation. culated to	indow U-valls and para	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K pendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+		1.89 8.22 13.8 4.732 12.49 4.76 0 1e)+0.04] a 1:00	K)	paragraph(32e) =	11221. 250	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) 9 (33) 66 (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg if details of therm Total fabric he	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = Si s parame sments whe ead of a de es: S (L al bridging eat loss	38 38 364 36, m ² Sides of interpretations of the properties of the department of the properties of the properties of the department of the properties	Openin m 18.5 0 ffective win sternal walk U) P = Cm - tails of the ulation. culated to own (36) =	indow U-valls and part construct using Ap = 0.05 x (3	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K pendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= [0.04] =	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] at tive Value a values of (36) =	K)	paragraph(32e) =	h 3.2 45.89 11221.	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (32) (33) (66) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = Si s parame sments whe ead of a de es: S (L al bridging eat loss	38 38 364 36, m ² Sides of interpretations of the properties of the department of the properties of the properties of the department of the properties	Openin m 18.5 0 ffective win sternal walk U) P = Cm - tails of the ulation. culated to own (36) =	indow U-valls and part construct using Ap = 0.05 x (3	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K pendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	= [0.04] =	(W/l 1.89 8.22 13.8 4.732 12.49 4.76 0 re)+0.04] at tive Value a values of (36) =	K)	paragraph(32e) =	11221. 250	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) 9 (33) 66 (34) (35)

(38)m= 39.02	38.74	38.46	37.16	36.92	35.79	35.79	35.58	36.22	36.92	37.41	37.93	ı	(38)
			37.10	30.92	35.79	33.79	33.36				37.93		(30)
Heat transfer (39)m= 92.02	91.74	91.46	90.16	89.92	88.79	88.79	88.58	89.22	= (37) + (3 89.92	90.41	90.93	ı	
(33)III= 32.02	31.74	31.40	30.10	05.52	00.73	00.73	00.00			Sum(39) ₁		90.16	(39)
Heat loss para	meter (H	HLP), W	m²K						= (39)m ÷				
(40)m= 1.24	1.24	1.24	1.22	1.22	1.2	1.2	1.2	1.21	1.22	1.22	1.23		_
Number of day	e in moi	oth (Tah	(12 ما					,	Average =	Sum(40) ₁	12 /12=	1.22	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ı	
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	ı	(41)
							l						
4. Water heat	tina ener	rav reaui	irement:								kWh/ye	ear:	
												, carr	
Assumed occu if TFA > 13.9			[1 - exn	(-0 0003	849 v (TF	- Δ -13 0	1211 + 0 ()013 x (Γ F Δ -13		34		(42)
if TFA £ 13.9		1 1.70 X	i cxp	(0.0000	7-3 X (11	A 10.0	<i>)</i> 2)] 1 0.0) X 610	11 A 15.	3)			
Annual averag									o torgot o		.76	ı	(43)
not more that 125	-		• •		-	-	o acriieve	a water us	se largel o	I			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ı	
Hot water usage is			<u> </u>					004					
(44)m= 98.73	95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14	98.73	ı	
								-	Γotal = Su	m(44) ₁₁₂ =		1077.07	(44)
Energy content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D	OTm / 3600	kWh/mor	th (see Ta	ables 1b, 1	c, 1d)		
(45)m= 146.42	128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8		_
If instantaneous w	ater heati	na at noint	of use (no	hot water	r storage)	enter () in	hoxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1412.21	(45)
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0	ı	(46)
Water storage		U	0	0	U	0	0	U	0	0	U		(40)
Storage volum	e (litres)	includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	ı	(47)
If community h	eating a	ind no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no		hot wate	er (this in	ıcludes i	nstantar	eous co	mbi boil	ers) ente	er '0' in (47)			
Water storage a) If manufact		eclared l	oss facto	nr is kna	wn (k\//h	/day)·					0	ı	(48)
Temperature f) 10 KHO	**** (1.***)	"day).					0	ı	(49)
Energy lost fro				ear			(48) x (49)	. =			0	ı	(50)
b) If manufact		•			or is not		(10)11(10)				U		(00)
Hot water stora	•			e 2 (kW	h/litre/da	ıy)					0	ı	(51)
If community had Volume factor	_		on 4.3								_	ı	(50)
Temperature f			2b								0	ı	(52) (53)
Energy lost fro				ear			(47) x (51)	x (52) x (53) =		0	ı	(54)
Enter (50) or (-	,y				(11) // (01)	- (/ ^ (/		0	ı	(55)
Water storage	. , .	•	for each	month			((56)m = (55) × (41)ı	m				•
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0	ı	(56)
If cylinder contains		-									-	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0	ı	(57)
,								-					` '

Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m	0	(58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo	ostat)	
(59)m= 0 0 0 0 0 0 0 0 0	0 0	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m		
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	(46)m + (57)m +	(59)m + (61)m
(62)m= 124.45 108.85 112.32 97.92 93.96 81.08 75.13 86.22 87.25 101.68	110.99 120.53	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	ion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		
(63)m= 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater		
(64)m= 124.45 108.85 112.32 97.92 93.96 81.08 75.13 86.22 87.25 101.68	110.99 120.53	
Output from water heate	r (annual) ₁₁₂	1200.38 (64)
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m	+ (57)m + (59)m	1
(65)m= 31.11 27.21 28.08 24.48 23.49 20.27 18.78 21.55 21.81 25.42	27.75 30.13	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is fi	rom community h	eating
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	
(66)m= 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96	116.96 116.96	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	l	
(67)m= 18.4 16.35 13.29 10.06 7.52 6.35 6.86 8.92 11.97 15.2	17.74 18.91	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	<u> </u>	
(68)m= 206.45 208.59 203.19 191.7 177.19 163.56 154.45 152.3 157.7 169.2	183.7 197.34	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	<u> </u>	
(69)m= 34.7 34.7 34.7 34.7 34.7 34.7 34.7 34.7	34.7 34.7	(69)
Pumps and fans gains (Table 5a)		· ,
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0	(70)
		(1.5)
Losses e.g. evaporation (negative values) (Table 5) (71)m= -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57	-93.57 -93.57	(71)
	-93.31	
Water heating gains (Table 5) (72)m= 41.82 40.49 37.74 34 31.57 28.15 25.25 28.97 30.29 34.17	38.54 40.5	(72)
	L	(12)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (70)m$		(70)
(73)m= 324.76 323.52 312.31 293.85 274.37 256.15 244.64 248.28 258.06 276.65	298.07 314.84	(73)
Solar gains:Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applical	alo orientation	
	FF	Gains
∪	able 6c	(W)
Southeast 0.9x 0.77 x 10.41 x 36.79 x 0.63 x	0.7 =	117.06 (77)
Southeast 0.9x 0.77 x 10.41 x 62.67 x 0.63 x	0.7 =	199.39 (77)
	<u> </u>	

Ca.,4baaa4aa					_		7			_				— ,,
Southeast 0.9x	0.77	×	10.	41	X _	85.75	X		0.63	×	0.7	=	272.82	(77)
Southeast 0.9x	0.77	X	10.	41	X	106.25	X		0.63	X	0.7	=	338.03	(77)
Southeast _{0.9x}	0.77	X	10.	41	x	119.01	X		0.63	X	0.7	=	378.62	(77)
Southeast _{0.9x}	0.77	X	10.	41	x	118.15	X		0.63	X	0.7	=	375.89	(77)
Southeast 0.9x	0.77	X	10.	41	x	113.91	X		0.63	X	0.7	=	362.39	(77)
Southeast 0.9x	0.77	X	10.	41	x	104.39	X		0.63	X	0.7	=	332.11	(77)
Southeast 0.9x	0.77	X	10.	41	x	92.85	X		0.63	X	0.7	=	295.4	(77)
Southeast 0.9x	0.77	X	10.	41	x	69.27	X		0.63	X	0.7	=	220.37	(77)
Southeast 0.9x	0.77	X	10.	41	x	44.07	X		0.63	X	0.7	=	140.21	(77)
Southeast 0.9x	0.77	X	10.	41	x	31.49	X		0.63	X	0.7	=	100.18	(77)
Northwest _{0.9x}	0.77	x	6.3	2	x \lceil	11.28	Īx		0.63	×	0.7		21.38	(81)
Northwest _{0.9x}	0.77	x	6.3	2	x	22.97	X		0.63	×	0.7		43.52	(81)
Northwest _{0.9x}	0.77	x	6.2	2	x	41.38	X		0.63	×	0.7	=	78.4	(81)
Northwest _{0.9x}	0.77	X	6.3	2	x	67.96	Īx		0.63	x	0.7	=	128.76	(81)
Northwest 0.9x	0.77	X	6.3	2	x	91.35	j x		0.63	x	0.7	=	173.08	(81)
Northwest _{0.9x}	0.77	x	6.2	2	x $\overline{\ }$	97.38	Īx		0.63	×	0.7		184.52	(81)
Northwest _{0.9x}	0.77	x	6.3	2	x	91.1	Īx		0.63	x	0.7		172.62	(81)
Northwest _{0.9x}	0.77	x	6.3	2	х	72.63	j×		0.63	x	0.7		137.61	(81)
Northwest _{0.9x}	0.77	x	6.3	2	х	50.42	j×		0.63	×	0.7		95.54	(81)
Northwest _{0.9x}	0.77	x	6.:	2	x	28.07	X		0.63	×	0.7	= =	53.18	(81)
Northwest _{0.9x}	0.77	x	6.:	2	x	14.2	X		0.63	×	0.7	-	26.9	(81)
Northwest _{0.9x}	0.77	x	6.:	2	x F	9.21	j ×		0.63	X	0.7	-	17.46	(81)
					_		_							
Solar gains in	watts, ca	lculated	for eac	h month			(83)n	n = Su	m(74)m .	(82)m				
(83)m= 138.44	242.91	351.22	466.79	551.71	560	.41 535.01	469	9.72	390.94	273.5	167.11	117.64]	(83)
Total gains – i	nternal a	nd solar	(84)m =	= (73)m ·	+ (83	3)m , watts					_	-	_	
(84)m= 463.19	566.43	663.53	760.65	826.08	816	.56 779.66	718	3.01	649	550.2	465.18	432.48		(84)
7. Mean inter	rnal temp	erature	(heating	season)									
Temperature	during h	eating p	eriods ir	the livi	ng ar	rea from Ta	ble 9	, Th1	(°C)				21	(85)
Utilisation fac	ctor for ga	ains for I	iving are	ea, h1,m	(see	e Table 9a)								
Jan	Feb	Mar	Apr	May	Jı	un Jul	A	ug	Sep	Oct	Nov	Dec]	
(86)m= 1	0.99	0.98	0.94	0.83	0.6	65 0.49	0.5	55	0.81	0.97	0.99	1		(86)
Mean interna	al tempera	ature in I	living are	ea T1 (fo	ollow	steps 3 to	7 in 1	 Гable	9c)				-	
(87)m= 19.66	19.86	20.16	20.53	20.81	20.		20.		20.88	20.49	20.01	19.63]	(87)
Temperature	during h	eating n	ariade ir	rest of	dwa	lling from T	ahla (a Th	2 (°C)			•	J	
(88)m= 19.89	19.89	19.89	19.91	19.91	19.	<u> </u>	1	.92	19.92	19.91	19.9	19.9]	(88)
	ļ	ļ			<u> </u>	<u> </u>	1				1		1	. ,
Utilisation fac	tor for ga	0.97	0.92	0.78	n2,m		9a) 0.4	12	0.72	0.95	0.99	1	1	(89)
(3.5)		ļ			<u> </u>				0.73		0.99		J	(09)
Mean interna		i			Ť	<u> </u>	i					T .	1	(0.5)
(90)m= 18.67	18.87	19.17	19.54	19.79	19	.9 19.92	19.	.92	19.85	19.51	19.03	18.65		(90)
									f	LA = Li\	ring area ÷ (4) =	0.2	(91)

Mean internal te	mneratur	e (for the	whole dw	ellina) – f	ΙΔ ν Τ1	+ (1 – fl	Δ) × T2					
		.37 19.		20.12	20.14	20.13	20.06	19.71	19.23	18.85		(92)
Apply adjustmer	nt to the m	nean inte	nal tempe		n Table	4e. whe						, ,
· · · · · · · · · · · · · · · · · · ·		.37 19.		20.12	20.14	20.13	20.06	19.71	19.23	18.85		(93)
8. Space heating	g requirer	nent		_								
Set Ti to the me the utilisation fac		•		ined at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb M	1ar A	or May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor	for gains	, hm:	•	•								
(94)m= 1 (0.99 0.9	97 0.9	1 0.78	0.58	0.4	0.45	0.74	0.95	0.99	1		(94)
Useful gains, hn	nGm , W :	= (94)m >	(84)m									
(95)m= 461.19 56	60.12 643	3.73 694	51 646.94	472.52	311.65	326.67	478.68	520.67	460.74	431.11		(95)
Monthly average	external	tempera	ture from	Table 8	•		,				ı	
` '		.5 8.9		14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for			' 	· · · · ·	-`` ′ 	-``	- ` 	-		1	l	
(97)m= 1340.94 13	l			489.73	313.92	330.81	532.07	819.38	1096.54	1332		(97)
Space heating re				1	i e	 	i i	í - `	<u> </u>		ı	
(98)m= 654.53 49	97.31 396	5.77 203	45 73.7	0	0	0	0	222.25	457.78	670.27		_
						Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3176.05	(98)
Space heating re	equireme	nt in kWh	/m²/year								42.92	(99)
8c. Space coolir	ng require	ment										
Calculated for Ju	une, July	and Augi	ıst. See Ta	able 10b				_			i	
		1ar A _l			Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate L	m (calcula	ated usin	25°C inte	ernal tem	perature	and ext	ernal ter	nperatur	e from T	able 10)		
Heat loss rate Li (100)m= 0	1	ated usin	1	ernal tem 834.59	perature 657.02	and ext	ernal ter	nperatur 0	e from T	able 10) 0		(100)
	0 (0 0	1				i e	Î		Î		(100)
(100)m= 0	o (0 0	1				i e	Î		Î		(100) (101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL	o of for loss h	$\begin{array}{c c} \hline 0 & 0 \\ \hline nm \\ \hline 0 & 0 \\ \hline s) = (100)$	0	0.91	0.95	0.93	0	0	0	0		(101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0	for loss h	$ \begin{array}{c cccc} & 0 & 0 \\ & nm & \\ & 0 & 0 \\ & s) = (100) \\ & 0 & 0 \end{array} $	0 m x (101)r	0.91 m 756.77	0.95 624.6	0.93 627.13	0 0	0	0	0		, ,
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain	o o o o o o o o o o o o o o o o o o o	$0 \ 0 \ 0$	0 m x (101)r 0 oplicable v	0.91 m 756.77	657.02 0.95 624.6 egion, se	673.18 0.93 627.13 ee Table	0 0 10)	0 0	0 0	0 0		(101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0	for loss h () () () () () () () () () ()	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 opplicable v	0.91 m 756.77 veather re 1041.33	657.02 0.95 624.6 egion, se 996.42	0.93 627.13 ee Table 925.78	0 0 10) 0	0 0	0 0	0 0		(101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain	for loss h () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () () (0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 pplicable v 0 nth, whole	0.91 m 756.77 veather re 1041.33 dwelling,	657.02 0.95 624.6 egion, se 996.42 continue	0.93 627.13 ee Table 925.78 ous (kW	0 0 10) 0	0 0	0 0	0 0		(101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling re	o o o o o o o o o o o o o o o o o o o	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 pplicable v 0 nth, whole	0.91 m 756.77 veather re 1041.33	657.02 0.95 624.6 egion, se 996.42	0.93 627.13 ee Table 925.78	0 0 10) 0 /h) = 0.0	0 0 0 24 x [(10	0 0 0 03)m - (0 0		(101)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0	o o o o o o o o o o o o o o o o o o o	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.91 m 756.77 veather re 1041.33 dwelling,	657.02 0.95 624.6 egion, se 996.42 continue	0.93 627.13 ee Table 925.78 ous (kW	0 0 10) 0 /h) = 0.0 Total	0 0 0 24 x [(10	0 0 0 03)m - (0 1,04)	0 0 0 102)m]		(101) (102) (103)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction	for loss h m (Watts ms calcula ms calcula equirement for loss h for loss	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.91 m 756.77 veather re 1041.33 dwelling,	657.02 0.95 624.6 egion, se 996.42 continue	0.93 627.13 ee Table 925.78 ous (kW	0 0 10) 0 /h) = 0.0 Total	0 0 0 24 x [(10	0 0 0 03)m - (0 1,04)	0 0 0 102)m]	x (41)m	(101) (102) (103)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hml (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact	o o o o o o o o o o o o o o o o o o o	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 opplicable v 0 nth, whole (98)m	0.91 m 756.77 veather re 1041.33 dwelling,	657.02 0.95 624.6 egion, se 996.42 continue 276.63	0.93 627.13 ee Table 925.78 ous (kW	0 0 10) 0 /h) = 0.0 Total f C =	0 0 0 24 x [(10 0 1 = Sum(0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m];	x (41)m 703.7	(101) (102) (103)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction	o o o o o o o o o o o o o o o o o o o	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.91 m 756.77 veather re 1041.33 dwelling,	657.02 0.95 624.6 egion, se 996.42 continue	0.93 627.13 ee Table 925.78 ous (kW	0 0 10) 0 /h) = 0.0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 03)m - (0 1,04) area ÷ (4	0 0 0 102)m]2 0 = 4) =	x (41)m 703.7	(101) (102) (103) (104) (105)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0	for loss h m (Watts ms calculate mequirement for loss h m (Watts ms calculate m	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 opplicable v 0 nth, whole (98)m 0	0.91 m 756.77 veather re 1041.33 dwelling, 204.88	657.02 0.95 624.6 egion, se 996.42 continue 276.63	0.93 627.13 ee Table 925.78 ous (kW 222.19	0 0 10) 0 /h) = 0.0 Total f C =	0 0 0 24 x [(10 0 1 = Sum(0 0 0 0 0 0 0 0 1,04) area ÷ (4	0 0 0 102)m];	x (41)m 703.7	(101) (102) (103)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hml (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact	for loss h m (Watts m (Watts ms calcula ms calcula mequirement for loss h m (Watts ms calcula	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 opplicable v 0 nth, whole (98)m 0	0.91 m 756.77 veather re 1041.33 dwelling, 204.88	657.02 0.95 624.6 egion, se 996.42 continue 276.63	0.93 627.13 ee Table 925.78 ous (kW 222.19	0 0 10) 0 /h) = 0.0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 1,04) area ÷ (4	0 0 0 102)m]2 0 = 4) =	x (41)m 703.7	(101) (102) (103) (104) (105)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0 Space cooling reset	for loss h m (Watts m (Watts ms calcula ms calcula mequirement for loss h m (Watts ms calcula	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 poplicable v 0 nth, whole (98)m 0 0 h = (104)r	0.91 m 756.77 veather re 1041.33 dwelling, 204.88 0.25	657.02 0.95 624.6 egion, se 996.42 continue 276.63 0.25 x (106)r	0.93 627.13 e Table 925.78 ous (kW 222.19	0 0 10) 0 Total f C = 0 Total	0 0 24 x [(10 0 1 = Sum(cooled :	0 0 0 03)m - (0 1,0,4) area ÷ (4 0	0 0 0 102)m];	x (41)m 703.7	(101) (102) (103) (104) (105)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0 Space cooling reset (107)m= 0	for loss h m (Watts m (Watts ms calcula mequirement mor (Table multiple multipl	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 poplicable v 0 nth, whole (98)m 0 h = (104)r 0	0.91 m 756.77 veather re 1041.33 dwelling, 204.88 0.25	657.02 0.95 624.6 egion, se 996.42 continue 276.63 0.25 x (106)r	0.93 627.13 e Table 925.78 ous (kW 222.19	0 0 10) 0 Total 0 Total	0 0 24 x [(10 0 1 = Sum(cooled : 0 7 = Sum(0 0 0 03)m - (0 1,0,4) area ÷ (4 0	0 0 0 102)m]; 0 = 4) = 0	x (41)m 703.7 1 0 175.92	(101) (102) (103) (104) (105) (106)
Utilisation factor (101)m= 0 Useful loss, hml (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0 Space cooling received Space cooling received Space cooling received Space cooling received	for loss h m (Watts m (Watts ms calcula ms calcula mequirement mor (Table quirement mor (Table quirement mor (Table	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 poplicable v 0 nth, whole (98)m 0 h = (104)r 0 m²/year	0.91 m 756.77 veather re 1041.33 dwelling, 204.88 0.25 m × (105) 51.22	657.02 0.95 624.6 egion, se 996.42 continue 276.63 0.25 × (106)r 69.16	0.93 627.13 e Table 925.78 ous (kW 222.19 0.25	0 0 10) 0 10) 0 Total 0 Total (107)	0 0 0 24 x [(10 0 1 = Sum(cooled : 0 1 = Sum(0 0 1 = Sum(0 0 0 = Sum(0 0 = Sum(0 0 0 = Sum(0 0 0 = Sum(0 0 0 = Sum(0 0	0 0 0 03)m - (0 1,0,4) area ÷ (4 0	0 0 0 102)m]; 0 = 4) = 0	x (41)m 703.7 1	(101) (102) (103) (104) (105) (106)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0 Space cooling recetation	for loss h m (Watts m (Watts ms calcula ms calcula mequirement mo (Table quirement quirement full	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 poplicable v 0 nth, whole (98)m 0 h = (104)r 0 m²/year	0.91 m 756.77 veather re 1041.33 dwelling, 204.88 0.25 m × (105) 51.22	657.02 0.95 624.6 egion, se 996.42 continue 276.63 0.25 × (106)r 69.16	0.93 627.13 e Table 925.78 ous (kW 222.19 0.25	0 0 10) 0 Total f C = 0 Total (107) ee section	0 0 24 x [(10 0 1 = Sum(cooled : 0 1 = Sum(0 0 0 1 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 0 102)m]; 0 = 4) = 0	703.7 1 0 175.92 2.38	(101) (102) (103) (104) (105) (106) (107) (108)
(100)m= 0 Utilisation factor (101)m= 0 Useful loss, hmL (102)m= 0 Gains (solar gain (103)m= 0 Space cooling reset (104)m to zee (104)m= 0 Cooled fraction Intermittency fact (106)m= 0 Space cooling received (107)m= 0 Space cooling received	for loss h m (Watts m (Watts ms calcula ms calcula mequirement mo (Table quirement quirement full	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 m x (101)r 0 poplicable v 0 nth, whole (98)m 0 h = (104)r 0 m²/year	0.91 m 756.77 veather re 1041.33 dwelling, 204.88 0.25 m × (105) 51.22	657.02 0.95 624.6 egion, se 996.42 continue 276.63 0.25 × (106)r 69.16	0.93 627.13 e Table 925.78 ous (kW 222.19 0.25	0 0 10) 0 Total f C = 0 Total (107) ee section	0 0 0 24 x [(10 0 1 = Sum(cooled : 0 1 = Sum(0 0 1 = Sum(0 0 0 = Sum(0 0 = Sum(0 0 0 = Sum(0 0 0 = Sum(0 0 0 = Sum(0 0	0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 0 102)m]; 0 = 4) = 0	x (41)m 703.7 1 0 175.92	(101) (102) (103) (104) (105) (106)

Target Fabric Energy Efficiency (TFEE)

52.09 (109)

		User Details:				
A NI	David David d			OTDO	20000	
Assessor Name: Software Name:	David Barsted Stroma FSAP 2012	Stroma Nur Software Ve			032333 n: 1.0.5.50	
Software Name.		roperty Address: House		V EI SIO	11. 1.0.5.50	
Address :	9 Cheyne Avenue, London,		<i>3</i> 1			
1. Overall dwelling dime		TWZ OAIV				
		Area(m²)	Av. Height(m	າ)	Volume(m³)
Ground floor		37 (1a) x	2.5	(2a) =	92.5	(3a)
First floor		37 (1b) x	2.7	(2b) =	99.9	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	74 (4)				_
Dwelling volume		(3a)+(3	b)+(3c)+(3d)+(3e)+	·(3n) =	192.4	(5)
2. Ventilation rate:						
	main secondar heating heating	y other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
			_	Air ch	anges per ho	
Infiltration due to chimne	/s, flues and fans = $(6a)+(6b)+(7a)$	(a)+(7b)+(7c) =	00	÷ (5) =		(8)
•	een carried out or is intended, procee		30 from (9) to (16)	÷ (3) =	0.16	(6)
Number of storeys in the	ne dwelling (ns)			ſ	0	(9)
Additional infiltration			[0	(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	truction	Ī	0	(11)
if both types of wall are pr deducting areas of openir	esent, use the value corresponding to	the greater wall area (after		_		_
=	loor, enter 0.2 (unsealed) or 0	1 (sealed), else enter 0)	Г	0	(12)
If no draught lobby, ent	er 0.05, else enter 0			ļ	0	(13)
Percentage of windows	and doors draught stripped			Ţ	0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square r	metre of envelop	oe area	5	(17)
If based on air permeabil	ity value, then (18) = [(17) ÷ 20]+(3), otherwise (18) = (16)		Ī	0.41	(18)
Air permeability value applie	s if a pressurisation test has been dor	e or a degree air permeabilit	y is being used			
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) =	:		0.38	(21)
Infiltration rate modified for	or monthly wind speed		, ,			
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (2	22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltr	ation rat	o (allowi	na for ch	oltor on	d wind c	rpood) –	(21a) v	(22a)m	•	•	•	•	
0.48	0.47	0.46	0.41	0.4	0.36	0.36	0.35	0.38	0.4	0.42	0.44	1	
Calculate effe		•	rate for t	he appli	cable ca	se				<u> </u>	<u> </u>		
If mechanic												0	(23a)
If exhaust air h		0 11	, ,	, (, ,	•	,, .	`) = (23a)			0	(23b)
If balanced with		-	-	_					DL \ (001-) [4 (00)	0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with hea	at recove	ery (MVI	TR) (248	$\frac{a)m = (22)}{0}$	2b)m + (23b) × [1 – (23c) 0	÷ 100]]	(24a)
(1)						<u> </u>	<u> </u>		<u> </u>				(24a)
b) If balance (24b)m= 0		o l	0	0 Without	neat rec	overy (N	0	0	0	0	0	1	(24b)
c) If whole h	ļ				ļ		<u> </u>					l	(= :0)
,	n < 0.5 ×			•	•				5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)r	ventilation								0.5]	!	!	ı	
(24d)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6		(24d)
Effective air	change	rate - en	iter (24a	or (24b	o) or (24	c) or (24	d) in box	x (25)				•	
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6		(25)
3. Heat losse	es and he	at lose r											
		rai IUSS k	varamett	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value kJ/m²-		A X k kJ/K
	Gros	SS	Openin	gs		m²				K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [0.04] = [(W/ 3.024	K)			kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r	m ² x x 1/2 3 x 1/2	W/m2 1.6 /[1/(1.3)+	2K = [0.04] = [3.024 11.29	K)			kJ/K (26) (27)
Doors Windows Type Windows Type	Gros area e 1	ss (m²)	Openin	gs ²	A ,r 1.89 9.14 15.33	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	2K = [0.04] = [0.04] = [3.024 11.29 18.94	K) 			kJ/K (26) (27) (27)
Doors Windows Type Windows Type Floor	Gros area e 1 e 2	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	eK = [0.04] = [0.04] = [= [3.024 11.29 18.94 5.824	K)			(26) (27) (27) (28)
Doors Windows Type Windows Type Floor Walls	Gros area e 1 e 2 87.8 36.6	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23	2K = [0.04] = [0.04] = [= = [(W/l 3.024 11.29 18.94 5.824 14.15	K)			(26) (27) (27) (28) (29)
Doors Windows Type Windows Type Floor Walls Roof	Gros area e 1 e 2 87.8 36.6	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52 36.64	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23	2K = [0.04] = [0.04] = [= = [(W/l 3.024 11.29 18.94 5.824 14.15	K)			kJ/K (26) (27) (27) (28) (29) (30)
Doors Windows Type Windows Type Floor Walls Roof Total area of e	Gros area e 1 e 2 87.8 36.6 elements	88 (m²) 84 , m²	Openin m 26.36	gs 2 3 ndow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [- 0.04] = [- = [- = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15		kJ/m²-		(26) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 87.8 36.6 elements d roof winddas on both	38 (m²) 34 , m² ows, use e sides of in	26.30 0 ffective will ternal wall	gs 2 3 ndow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15		kJ/m²-		kJ/K (26) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area	Gros area e 1 e 2 87.8 36.6 elements d roof windows on both ss, W/K =	88 (m²) 84 , m² ows, use e sides of in = S (A x	26.30 0 ffective will ternal wall	gs 2 3 ndow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	$ \begin{array}{ccc} 2K & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & =$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0		kJ/m²-	X	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both ss, W/K: Cm = S(ss (m²) 88 64 , m² ows, use e sides of in = S (A x (A x k)	26.36 0 ffective winternal walk	gs 2 6 ndow U-va ds and part	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions	x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	$ \begin{array}{ccc} 2K & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & = & \\ & & = & \\ $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0	as given in [2] + (32a).	kJ/m²-	7 ST.38	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are. Fabric heat los Heat capacity Thermal mass For design asses can be used inste	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both ss, W/K: Cm = S(g parame sments whe ad of a december area	ss (m²) 88 64 , m² ows, use e sides of in = S (A x (A x k)) eter (TMF) ere the detailed calculations	26.36 0 ffective winternal walk U) P = Cm ÷ tails of the ulation.	gs ndow U-va ls and part - TFA) ir constructi	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul titions	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{ccc} 2K & = & \\ $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	as given in (2) + (32a).: Medium	paragraph(32e) =	7 3.2 57.38 10750.	(26) (27) (27) (28) (29) (30) (31) (32) (33) (34)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design asses can be used inste Thermal bridg	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both es, W/K: Cm = S(esparame es : S (L	ss (m²) 88 64 64 64 65 66 67 68 68 68 68 68 68 68 68	26.30 26.30 0 ffective winternal walk U) P = Cm ÷ tails of the ulation. culated to	gs 2 ndow U-vals and part constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{ccc} 2K & = & \\ $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	as given in (2) + (32a).: Medium	paragraph(32e) =	7 3.2 57.38 10750.	kJ/K (26) (27) (28) (29) (30) (31) (32) 3 (33) 06 (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both ss, W/K: Cm = S(s parame sments who ad of a deces: S (L al bridging	ss (m²) 88 64 64 64 65 65 66 67 68 68 68 68 68 68 68 68	26.30 26.30 0 ffective winternal walk U) P = Cm ÷ tails of the ulation. culated to	gs 2 ndow U-vals and part constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	2K = [0.04] = [(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	as given in (2) + (32a).: Medium	paragraph(32e) =	57.38 10750. 250	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (32) (33) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of therma Total fabric he	Gros area e 1 e 2 87.8 36.6 elements d roof winddas on both ess, W/K = Cm = S(esparame esments whead of a decested of a d	ss (m²) 88 64 , m² ows, use e sides of in = S (A x k) eter (TMF) ere the declared calculation (x Y) calculate (x Y) calc	26.36 26.36 0 ffective winternal walk U) P = Cm ÷ tails of the valation. culated to own (36) =	gs 2 ndow U-vals and part - TFA) ir construction using Ap = 0.05 x (3)	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 10)+0.04] at tive Value at values of the value of the value at the value	as given in 2) + (32a). : Medium	paragraph(32e) =	7 3.2 57.38 10750.	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) 3 (33) 06 (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of thermal	Gros area e 1 e 2 87.8 36.6 elements d roof winddas on both ess, W/K = Cm = S(esparame esments whead of a decested of a d	ss (m²) 88 64 , m² ows, use e sides of in = S (A x k) eter (TMF) ere the declared calculation (x Y) calculate (x Y) calc	26.36 26.36 0 ffective winternal walk U) P = Cm ÷ tails of the valation. culated to own (36) =	gs 2 ndow U-vals and part - TFA) ir construction using Ap = 0.05 x (3)	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 10)+0.04] at tive Value at values of the value of the value at the value	as given in (2) + (32a).: Medium	paragraph(32e) =	57.38 10750. 250	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (32) (33) (34) (35)

(38)m= 39.02	38.74	38.46	37.16	36.92	35.79	35.79	35.58	36.22	36.92	37.41	37.93		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 108.18	8 107.9	107.62	106.32	106.08	104.95	104.95	104.74	105.38	106.08	106.57	107.09		_
Heat loss pa	rameter (I	HLP), W	m²K						Average = = (39)m ÷	Sum(39) ₁ . (4)	12 /12=	106.32	(39)
(40)m= 1.46	1.46	1.45	1.44	1.43	1.42	1.42	1.42	1.42	1.43	1.44	1.45		
Ni wakan af d	:		l- 4-\					,	Average =	Sum(40) ₁	12 /12=	1.44	(40)
Number of da	i	1 ` ` 	· ·	May	lup	lul	Λιια	Con	Oct	Nov	Dec		
(41)m= 31	28	Mar 31	Apr 30	31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	30	31		(41)
(41)		1 01			00			00					(**)
1 Water be	oting one	rav rogu	iromont:								k/Mb/v	or:	
4. Water he	aling ene	rgy requi	nement.								kWh/ye	tal.	
Assumed oci if TFA > 13	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13		.34		(42)
if TFA £ 13 Annual avera	,	otor uco	ao in litro	o por de	v Vd ov	orogo –	(25 v NI)	. 26					(40)
Reduce the ann	•		,	•		_	` ,		se target o).76		(43)
not more that 12	25 litres per	person pei	day (all w	ater use, l	hot and co	ld)							
Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	e in litres pe	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m= 98.73	95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14	98.73		_
Energy content	of hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.07	(44)
(45)m= 146.42	2 128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8		
15 3-1-1-1-1-1					()		h (40		Total = Su	m(45) ₁₁₂ =	=	1412.21	(45)
If instantaneous									<u> </u>	1	ı		(40)
(46)m= 0 Water storage	e loss:	0	0	0	0	0	0	0	0	0	0		(46)
Storage volu) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)						, ,
Otherwise if	_			-			, ,	ers) ente	er '0' in (47)			
Water storag													
a) If manufa				or is kno	wn (kWh	n/day):					0		(48)
Temperature											0		(49)
Energy lost f b) If manufa		_	-		or ic not		(48) x (49)) =			0		(50)
Hot water sto			-								0		(51)
If community	•			`		,					•		, ,
Volume factor	or from Ta	ble 2a									0		(52)
Temperature	factor fro	m Table	2b								0		(53)
Energy lost f		•	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) o	, , ,	,									0		(55)
Water storag	e loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m 				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder conta	ins dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)

Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m	
(modified by factor from Table H5 if there is solar water heating and a cylinder thermosta	t)
(59)m= 0 0 0 0 0 0 0 0 0 0	0 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0 (61)
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m = 0.85 \times (45)m = 0.85 \times (45)m + (46)m = 0.85 \times (45)m = 0.85 \times (4$)m + (57)m + (59)m + (61)m
	10.99 120.53 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	o nate. Iteamig)
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0 (63)
Output from water heater	
	10.99 120.53
Output from water heater (ar	
Heat gains from water heating, kWh/month 0.25 $\stackrel{\cdot}{}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (,
	7.75 30.13 (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	
	Nov Dec
(66)m= 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 1	16.96 116.96 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 18.4 16.35 13.29 10.06 7.52 6.35 6.86 8.92 11.97 15.2 1	7.74 18.92 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 206.45 208.59 203.19 191.7 177.19 163.56 154.45 152.3 157.7 169.2 1	83.7 197.34 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 34.7 34.7 34.7 34.7 34.7 34.7 34.7 34.7	34.7 34.7 (69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0 (70)
Losses e.g. evaporation (negative values) (Table 5)	
	03.57 -93.57 (71)
Water heating gains (Table 5)	
	8.54 40.5 (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m$, ,
	98.07 314.84 (73)
6. Solar gains:	314.04
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable of	rientation.
Orientation: Access Factor Area Flux a	FF Gains
Orientation: Access Factor Area Flux g_ Table 6d m² Table 6a Table 6b Table	FF Gains e 6c (W)
Table 6d m ² Table 6a Table 6b Table	e 6c (W)
0 –	

0 " "					_		,			, ,				_
Southeast 0.9x	0.77	X	15.3	33	x L	85.75	X	0.7	6	_ x [0.7	=	484.66	(77)
Southeast 0.9x	0.77	X	15.	33	x	106.25	X	0.7	6	X	0.7	=	600.51	(77)
Southeast 0.9x	0.77	X	15.3	33	x	119.01	X	0.7	'6	x	0.7	=	672.62	(77)
Southeast 0.9x	0.77	X	15.3	33	X	118.15	X	0.7	'6	x	0.7	=	667.76	(77)
Southeast 0.9x	0.77	X	15.	33	x	113.91	X	0.7	'6	x	0.7	=	643.79	(77)
Southeast 0.9x	0.77	X	15.3	33	X	104.39	X	0.7	6	x	0.7	=	589.99	(77)
Southeast 0.9x	0.77	X	15.3	33	x	92.85	X	0.7	'6	x	0.7	=	524.78	(77)
Southeast 0.9x	0.77	X	15.3	33	x [69.27	X	0.7	'6	x	0.7	=	391.49	(77)
Southeast 0.9x	0.77	X	15.	33	x	44.07	X	0.7	'6	x	0.7	=	249.08	(77)
Southeast 0.9x	0.77	X	15.	33	x	31.49	X	0.7	'6	x	0.7	=	177.96	(77)
Northwest 0.9x	0.77	X	9.1	4	x	11.28	X	0.7	' 6	x	0.7	=	38.02	(81)
Northwest 0.9x	0.77	X	9.1	4	x	22.97	X	0.7	' 6	x	0.7	=	77.39	(81)
Northwest 0.9x	0.77	x	9.1	4	x	41.38	X	0.7	6	x	0.7		139.43	(81)
Northwest 0.9x	0.77	x	9.1	4	x	67.96	X	0.7	6	Īx	0.7	=	228.99	(81)
Northwest 0.9x	0.77	x	9.1	4	x	91.35	x	0.7	6	x	0.7	=	307.81	(81)
Northwest 0.9x	0.77	X	9.1	4	х	97.38	X	0.7	·6	i x	0.7		328.16	(81)
Northwest 0.9x	0.77	X	9.1	4	х	91.1	X	0.7	·6	×	0.7		306.98	(81)
Northwest _{0.9x}	0.77	×	9.1	4	x 🗀	72.63	X	0.7	·6	i x	0.7	-	244.73	(81)
Northwest 0.9x	0.77	×	9.1	4	x $\overline{}$	50.42	X	0.7	·6	i x	0.7	╡ -	169.9	(81)
Northwest 0.9x	0.77	×	9.1	4	х	28.07	X	0.7	6	i x	0.7	=	94.58	(81)
Northwest 0.9x	0.77	×	9.1	4	х	14.2	X	0.7	·6] _x [0.7	=	47.84	(81)
Northwest 0.9x	0.77	×	9.1	4	x \vdash	9.21) x	0.7	·6] _× [0.7		31.05	(81)
_					<u> </u>		_							
Solar gains in	watts, cald	culated	for eacl	n month			(83)m	n = Sum(7	'4)m	(82)m				
(83)m= 245.97	431.61	624.09	829.5	980.43	995.	92 950.78	834	.72 694	4.68	486.06	296.92	209.01]	(83)
Total gains – i	nternal an	d solar	(84)m =	= (73)m -	+ (83)	m , watts							_	
(84)m= 570.73	755.13	936.41	1123.36	1254.81	1252	.07 1195.42	1083	3.01 952	2.74	762.72	594.99	523.85		(84)
7. Mean inter	nal tempe	rature ((heating	season)									
Temperature	during he	ating p	eriods ir	the livi	ng ar	ea from Tal	ble 9	, Th1 (°	C)				21	(85)
Utilisation fac	ctor for gai	ns for li	iving are	ea, h1,m	(see	Table 9a)								_
Jan	Feb	Mar	Apr	May	Ju	n Jul	А	ug S	Вер	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.95	0.86	0.7	0.5	2 0.38	0.4	14 0.	69	0.92	0.99	1	1	(86)
Mean interna	l temperat	ure in I	iving are	ea T1 (fo	llow	steps 3 to 7	7 in T	able 90	:)		•		-	
(87)m= 19.51		20.19	20.61	20.87	20.9	-i	20.		.91	20.52	19.92	19.46]	(87)
` ′	<u> </u>		ا ماماد		اميدا							<u> </u>	J	
Temperature (88)m= 19.72	19.72	19.72	19.74	19.74	19.7	<u> </u>	19.	`	.74	19.74	19.73	19.73	1	(88)
	<u> </u>							, 5 18	., +	13.14	19.73	19.73]	(50)
Utilisation fac						· 1	T -	. 1	<u>-, </u>	0.7-	1		1	(00)
(89)m= 0.99	0.98	0.93	0.82	0.63	0.4	2 0.28	0.3	32 0.	59	0.89	0.98	0.99	J	(89)
Mean interna	 -	ure in t	he rest	of dwelli	ng T2	2 (follow ste	eps 3	to 7 in	Table	9c)		ı	7	
(90)m= 18.39	18.68	19.06	19.45	19.66	19.7	4 19.75	19.	75 19	.71	19.39	18.81	18.35		(90)
									fL	A = Liv	ing area ÷ (4	4) =	0.2	(91)

Mean internal	temner	ature (fo	r the wh	ole dwe	lling) – fl	Δ ν Τ1	+ (1 – fl	Δ) v T2					
(92)m= 18.62	18.91	19.29	19.69	19.91	19.99	20	20	19.95	19.62	19.04	18.58		(92)
Apply adjustm	nent to t	he mean	internal	l temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.62	18.91	19.29	19.69	19.91	19.99	20	20	19.95	19.62	19.04	18.58		(93)
8. Space hear	ting requ	uirement											
Set Ti to the r			•		ed at ste	ep 11 of	Table 9l	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		
Utilisation fac	tor for g		•	,	<u> </u>			<u>'</u>	<u> </u>	<u> </u>			
(94)m= 0.99	0.97	0.93	0.82	0.64	0.44	0.3	0.35	0.61	0.89	0.98	0.99		(94)
Useful gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m= 565.08	733.7	867.28	917.66	804.06	554.94	355.45	374.4	578.42	677.27	581.87	520.1		(95)
Monthly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate						-``		`					
(97)m= 1549.22				870.75	565.56	356.9	377.13	616.49	956.63	1272.34	1539.67		(97)
Space heating	<u> </u>				i	i -		i i	í - `	<u> </u>	i		
(98)m= 732.2	522.87	378.92	165.25	49.62	0	0	0	0	207.84	497.14	758.55		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	3312.38	(98)
Space heating	g require	ement in	kWh/m²	² /year								44.76	(99)
8c. Space cod	oling rec	luiremen	nt										
Calculated for	r June, J	July and	August.	See Tal	ole 10b			ı	·	ı			
Jan	Feb	Mar	۸ ۳ ۳	N 4									
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		(400)
Heat loss rate (100)m= 0	Lm (ca	lculated 0											(100)
Heat loss rate (100)m= 0 Utilisation fac	Lm (ca 0 tor for lo	lculated 0 ss hm	using 25	5°C inter	nal temp 986.51	perature 776.61	and exte	ernal ten	nperatur 0	e from T	able 10)		, ,
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0	e Lm (ca 0 tor for lo	lculated 0 ss hm 0	using 25 0	5°C inter	986.51 0.94	perature	and ext	ernal ten	nperatur	e from T	able 10)		(100) (101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h	tor for lo	lculated 0 ess hm 0 /atts) = (using 25 0 0 (100)m x	0 0 0 (101)m	986.51 0.94	776.61 0.97	and extended and e	ernal ten	o 0	e from T	able 10) 0		(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0	e Lm (ca 0 tor for lo 0 mLm (W	lculated 0 ess hm 0 /atts) = (0 0 (100)m x	0 0 0 (101)m	986.51 0.94 928.99	0.97 752.33	and exter 796.01 0.95	ernal ten 0 0	nperatur 0	e from T	able 10)		, ,
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar c	e Lm (ca 0 tor for lc 0 mLm (W 0 gains ca	lculated 0 oss hm 0 /atts) = (0	0 0 100)m x 0 for appli	0 0 (101)m 0 cable we	986.51 0.94 928.99 eather re	oerature 776.61 0.97 752.33	and external and e	0 0 0 10)	o 0 0	e from T 0 0	able 10) 0 0		(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the color) (103)m= 0	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	lculated 0 oss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli	0 0 (101)m 0 cable we	986.51 0.94 928.99 eather re	0.97 752.33 egion, se	796.01 0.95 759.74 e Table	0 0 0 10)	o 0 0	e from T 0 0 0	able 10) 0 0	((41) m	(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar c	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	lculated 0 oss hm 0 /atts) = (0 culated 0 ement fo	o (100)m x o for appli o r month,	0 (101)m 0 cable we	986.51 0.94 928.99 eather re	0.97 752.33 egion, se	796.01 0.95 759.74 e Table	0 0 0 10)	o 0 0	e from T 0 0 0	able 10) 0 0	c (41)m	(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar g (103)m= 0 Space cooling	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	lculated 0 oss hm 0 /atts) = (0 culated 0 ement fo	o (100)m x o for appli o r month,	0 (101)m 0 cable we	986.51 0.94 928.99 eather re	0.97 752.33 egion, se	796.01 0.95 759.74 e Table	0 0 0 10)	o 0 0	e from T 0 0 0	able 10) 0 0	c (41)m	(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the cooling set (104)m to	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 100)m x 0 for appli 0 r month,	o (101)m o cable we whole o	986.51 0.94 928.99 eather re 1550.36	776.61 0.97 752.33 egion, se 1482.38 continuo	and external and e	0 0 10) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 24 x [(10	e from T 0 0 0 0 0 03)m – (able 10) 0 0 0 102)m] 3	c (41)m 1431.48	(101)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	o (101)m o cable we whole o	986.51 0.94 928.99 eather re 1550.36	776.61 0.97 752.33 egion, se 1482.38 continuo	and external and e	0 0 10) 0 7h) = 0.0	0 0 0 24 x [(10	e from T 0 0 0 0 0 0 0 1,0,4)	able 10) 0 0 102)m] x		(101) (102) (103)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar c (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency face	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	0 (100)m x 0 for appli 0 r month, 3 x (98	o (101)m o cable we whole o	986.51 0.94 928.99 eather re 1550.36 dwelling,	0.97 752.33 egion, se 1482.38 continuo 543.16	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	1431.48	(101) (102) (103)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	o (101)m o cable we whole o	986.51 0.94 928.99 eather re 1550.36	776.61 0.97 752.33 egion, se 1482.38 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3 0 = 4) =	1431.48 1	(101) (102) (103) (104) (105)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the set (104)m to (104)m= 0 Cooled fraction Intermittency face (106)m= 0	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 actor (Ta	lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 able 10b 0	0 (100)m x 0 for appli 0 r month, 3 x (98 0	o (101)m o cable we whole o)m o	986.51 0.94 928.99 eather residuelling, 447.38	776.61 0.97 752.33 egion, se 1482.38 continuo 543.16	and extermination and extermination of the content	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	1431.48	(101) (102) (103)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency fac (106)m= 0 Space cooling	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire zero if (0 n actor (Ta 0	lculated 0 lcss hm 0 /atts) = (0 lculated	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 (101)m 0 cable we 0 whole c)m 0	986.51 0.94 928.99 eather re 1550.36 welling, 447.38 0.25 × (105)	0.97 752.33 egion, se 1482.38 continuo 543.16 0.25 × (106)r	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled :	e from T 0 0 0 0 0 1,0,4) area ÷ (4	able 10) 0 0 102)m]; 0 = 1) =	1431.48 1	(101) (102) (103) (104) (105)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the set (104)m to (104)m= 0 Cooled fraction Intermittency face (106)m= 0	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 actor (Ta	lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 able 10b 0	0 (100)m x 0 for appli 0 r month, 3 x (98 0	o (101)m o cable we whole o)m o	986.51 0.94 928.99 eather residuelling, 447.38	776.61 0.97 752.33 egion, se 1482.38 continuo 543.16	and extermination and extermination of the content	0 0 10) 0 Total f C =	0 0 0 0 24 x [(10 0 = Sum(cooled :	e from T 0 0 0 0 0 1.0.4) area ÷ (4	able 10) 0 0 0 102)m] 3 10 = 1) = 0	1431.48	(101) (102) (103) (104) (105)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the solar o	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta 0	lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 ment for 0	0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	0 (101)m 0 cable we 0 whole co)m 0	986.51 0.94 928.99 eather re 1550.36 welling, 447.38 0.25 × (105)	0.97 752.33 egion, se 1482.38 continuo 543.16 0.25 × (106)r	and external and e	0 0 10) 0 Total 10 Total 0 Total	0 0 0 24 x [(10) 0 = Sum(cooled :	e from T 0 0 0 0 0 1.0.4) area ÷ (4	able 10) 0 0 102)m]; 0 = 1) =	1431.48 1 0	(101) (102) (103) (104) (105) (106)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the second of th	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require 2ero if (0 n actor (Ta 0 requirer	lculated 0 loss hm 0 latts) = (0 lculated 0 lculated 0 lculated 0 loss hm 0 lculated 0 lculated 0 loss hm 0 lculated 0 l	0 100)m x 0 for appli 0 r month, 3 x (98 0) 0 wonth =	0 (101)m 0 cable we 0 whole c)m 0	986.51 0.94 928.99 eather re 1550.36 dwelling, 447.38 0.25 × (105) 111.85	0.97 752.33 egion, se 1482.38 continue 543.16 0.25 × (106)r 135.79	and external and e	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 + S	e from T 0 0 0 0 0 1.0.4) area ÷ (4	able 10) 0 0 0 102)m] 3 10 = 1 0 0	1431.48	(101) (102) (103) (104) (105) (106)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the solar o	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 requirer 0	lculated 0 loss hm 0 l/atts) = (0 lculated 0 lculated 0 losement fo 104)m < 0 losement for 0	0 100)m x 0 for appli 0 r month, 3 x (98 0) 0 wonth =	0 (101)m 0 cable we 0 whole c)m 0	986.51 0.94 928.99 eather re 1550.36 dwelling, 447.38 0.25 × (105) 111.85	0.97 752.33 egion, se 1482.38 continue 543.16 0.25 × (106)r 135.79	and external and e	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 0 24 x [(10 0 = Sum(cooled : 0 I = Sum(0 = Sum(0 i = Sum(e from T 0 0 0 0 0 1,04) area ÷ (4 0 1,04) 1,07)	able 10) 0 0 0 102)m] 3 10 = 1 0 0	1431.48 1 0 357.87 4.84	(101) (102) (103) (104) (105) (106) (107) (108)
Heat loss rate (100)m= 0 Utilisation fac (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the second of th	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 requirer 0	lculated 0 loss hm 0 l/atts) = (0 lculated 0 lculated 0 losement fo 104)m < 0 losement for 0	0 100)m x 0 for appli 0 r month, 3 x (98 0) 0 wonth =	0 (101)m 0 cable we 0 whole c)m 0	986.51 0.94 928.99 eather re 1550.36 dwelling, 447.38 0.25 × (105) 111.85	0.97 752.33 egion, se 1482.38 continue 543.16 0.25 × (106)r 135.79	and external and e	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 + S	e from T 0 0 0 0 0 1,04) area ÷ (4 0 1,04) 1,07)	able 10) 0 0 0 102)m] 3 10 = 1 0 0	1431.48 1 0	(101) (102) (103) (104) (105) (106)

				No (- ' l -						
			User D	vetails:						
Assessor Name:	David Barsted				a Num				032333	
Software Name:	Stroma FSAP	_•			are Vei			Versic	n: 1.0.5.50	
Aululus a s	O Chavea Avan			Address	: House	1				
Address: 1. Overall dwelling dime	9 Cheyne Aven	ue, London,	1 VV 2 6 P	MN						
1. Overall dwelling diffie	1310113.		Δre	a(m²)		Av. Hei	aht(m)		Volume(m ³	3)
Ground floor			70	37	(1a) x		.5	(2a) =	92.5	(3a)
First floor				37	(1b) x	2	.7	(2b) =	99.9	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)	+(1e)+(1n) 🔚	74	(4)			_		
Dwelling volume					(3a)+(3b))+(3c)+(3d)+(3e)+	(3n) =	192.4	(5)
2. Ventilation rate:										
	main heating	secondary heating	y	other		total			m³ per hou	r
Number of chimneys		+ 0] + [0] = [0	X	40 =	0	(6a)
Number of open flues	0	+ 0] + [0	= [0	X	20 =	0	(6b)
Number of intermittent far	ns					3	x	10 =	30	(7a)
Number of passive vents						0	x	10 =	0	(7b)
Number of flueless gas fin	res					0	x	40 =	0	(7c)
								Air ch	anges per ho	
Infiltration due to chimney	e flues and fans	(6a)+(6b)+(7a)	a)+(7b)+(7c) =	Г	30		÷ (5) =	0.16	(8)
If a pressurisation test has be	·				continue fr			÷ (0) =	0.16	(0)
Number of storeys in th	e dwelling (ns)								0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or tim	ber frame or	0.35 fo	r mason	ry constr	uction			0	(11)
if both types of wall are pr deducting areas of openin			the great	ter wall are	ea (after					
If suspended wooden f			1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	er 0.05, else ente	r 0							0	(13)
Percentage of windows	and doors draug	ht stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) +	- (15) =		0	(16)
Air permeability value,	q50, expressed in	cubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	5	(17)
If based on air permeabili	ty value, then (18)	$= [(17) \div 20] + (8)$), otherw	ise (18) =	(16)				0.41	(18)
Air permeability value applies		st has been don	e or a deg	gree air pe	rmeability	is being us	sed			
Number of sides sheltere	d			(20) 1	10 07E v (4	10)1			1	(19)
Shelter factor					[0.075 x (1	9)] =			0.92	(20)
Infiltration rate incorporati	ng shelter factor			(21) = (18	6) x (20) =				0.38	(21)
·										
Infiltration rate modified for		1 1		T .	<u> </u>			_	1	
Infiltration rate modified for	Mar Apr N	peed May Jun	Jul	Aug	Sep	Oct	Nov	Dec		

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

5.1

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	o (allowi	na for ok	oltor on	d wind a	nood) –	(21a) v	(22a)m	•	•	•	•	
0.48	0.47	e (allowi	0.41	0.4	0.36	0.36	0.35	0.38	0.4	0.42	0.44	1	
Calculate effe	ctive air	change i	l '	• • •			0.00	0.00	0.1	0.12	0.11]	
If mechanic	al ventila	ation:										0	(23a)
If exhaust air h		0		, ,	, ,	. ,	,, .	`) = (23a)			0	(23b)
If balanced wit		-	-	_								0	(23c)
a) If balance	1	1	i		·	- ` ` 	- ^ `	í `	 		```	÷ 100]	(5.4.)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0	J	(24a)
b) If balance	1		i		i	· · · · ·	· · ·	 	- 	'	ı	1	(5.41)
(24b)m = 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h				•					E (00k	. \			
(24c)m = 0	$\frac{11 < 0.5 \times}{0}$	(23b), t	nen (240	(230) = (230)	o); otner	wise (24)	C) = (221)	0) m + 0.	5 × (231	0	0	1	(24c)
			<u> </u>		<u> </u>				0			J	(240)
d) If natural if (22b)r		on or wn en (24d)							0.5]				
(24d)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(24d)
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in box	x (25)					
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6]	(25)
					•	1	1					1	
3 Heat losse	es and he	at loss r	naramet	⊃r·									
3. Heat losse	es and he Gros area	SS	oarameto Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/ 3.024				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 1.89 9.14 15.33	m ² x x 1/2	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	2K = [- 0.04] = [3.024 11.29 18.94				kJ/K (26) (27) (27)
Doors Windows Type Windows Type	Gros area e 1 e 2	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+		3.024 11.29 18.94 5.824				kJ/K (26) (27) (27) (28)
Doors Windows Type Windows Type Floor	Gros area e 1 e 2	SS (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23	2K = [- 0.04] = [- 0.04] = [= = [(W/l 3.024 11.29 18.94 5.824 14.15				kJ/K (26) (27) (27) (28) (29)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52 36.64	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [= = [3.024 11.29 18.94 5.824				kJ/K (26) (27) (27) (28) (29) (30)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e	Gros area e 1 e 2 87.8	ss (m²)	Openin m	gs ²	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9	m ²	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [- 0.04] = [= = [= = [(W/) 3.024 11.29 18.94 5.824 14.15				(26) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 87.8 36.6 elements	38 (m²) 38 34 34 34 35, m²	Openin m 26.3 0	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [- 0.04] = [- = [- = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15	k)	kJ/m²-	k	kJ/K (26) (27) (27) (28) (29) (30)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are	Gros area e 1 e 2 87.8 36.6 elements d roof winders on both	38 64 64 64 60 60 60 60 60 60 60 60 60 60	26.30 0 effective winternal wall	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x1/2 x x x1/2 x x1	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	2K = [- 0.04] = [(W/) 3.024 11.29 18.94 5.824 14.15 4.15	k)	kJ/m²-	K	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both	38 (m²) 38 34 34 35, m² 36 36 37 38 38 38 39 39 39 39 39 39 39 39 39 39 39 39 39	26.30 0 effective winternal wall	gs 3 indow U-ve	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x1/2 x x x1/2 x x1	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	$ \begin{array}{ccc} 2K & = & \\ $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0	k)	kJ/m²-	1 3.2 57.38	(26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity	Gros area e 1 e 2 87.8 36.6 elements d roof winde as on both ss, W/K: Cm = S(38 38 34 34 34 35 36 37 38 38 39 30 30 30 30 30 30 30 30 30 30	26.30 0 effective winternal wall	gs p 6 ndow U-va ls and pan	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions	x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11	$ \begin{array}{ccc} 2K & = & \\ & -0.04 & = & \\ & -0.04 & = & \\ & -0.04 & = & \\ & $	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0	K)	kJ/m²-	7 3.2 57.38 10750.0	(26) (27) (27) (28) (29) (30) (31) (32) (33) (34)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments wh	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 offective with ternal wall U) P = Cm = tails of the	gs 6 ndow U-ve ls and pan	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculations	x1/3 x1/3 x x1/4 x x 2 x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & \\ & = & \\$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	1 3.2 57.38	(26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses	Gros area e 1 e 2 87.8 36.6 elements d roof winder as on both ss, W/K: Cm = S(s parame sments whe ead of a de	ss (m²) 38 34 34 35, m² 364 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 366 367 368 368 368 368 368 368	26.30 26.30 0 offective winternal wall U) P = Cm - tails of the culation.	gs ndow U-va ls and pan - TFA) ir construct	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calcul titions	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & \\ & = & \\$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments whe ead of a de es: S (L	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs andow U-vals and pan TFA) ir constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & \\ & = & \\$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	kJ/K (26) (27) (27) (28) (29) (30) (31) (32) (33) (6) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg	Gros area e 1 e 2 87.8 36.6 elements d roof winde as on both ss, W/K: Cm = S(s parame sments whe ead of a de es : S (L al bridging	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	26.30 26.30 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs andow U-vals and pan TFA) ir constructions	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	2K = [- 0.04] = [(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 re)+0.04] a	K)	paragraph(32e) =	7 3.2 57.38 10750.0	(26) (27) (27) (28) (29) (30) (31) (32) (33) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design asses can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements d roof wind as on both ss, W/K: Cm = S(s parame sments whe ead of a de es: S (L al bridging eat loss	SS (m²) 38 34 34 34 35 36 37 38 38 38 39 30 30 30 30 30 30 30 30 30	26.30 26.30 0 effective with ternal walk to the tails of the tails	gs indow U-value TFA) in construction using Ap = 0.05 x (3)	A ,r 1.89 9.14 15.33 36.4 61.52 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/2 x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1.6 /[1/(1.3)+ /[1/(1.3)+ 0.16 0.23 0.11 0 formula 1 (26)(30)	$ \begin{array}{cccc} 2K & = & & \\ & = & & \\ & =$	(W// 3.024 11.29 18.94 5.824 14.15 4.15 0 10)+0.04] at tive Value at values of the value of the value at the value	K)	paragraph(32e) =	57.38 10750.0 250	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (36)

													ı	
(38)m=	39.02	38.74	38.46	37.16	36.92	35.79	35.79	35.58	36.22	36.92	37.41	37.93		(38)
	ansfer c								` ′	= (37) + (ı	
(39)m=	108.18	107.9	107.62	106.32	106.08	104.95	104.95	104.74	105.38	106.08	106.57	107.09		7(00)
Heat Id	ss para	meter (H	HLP), W	m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	106.32	(39)
(40)m=	1.46	1.46	1.45	1.44	1.43	1.42	1.42	1.42	1.42	1.43	1.44	1.45		_
Numbe	er of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.44	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ı	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	ı	(41)
			l											
4. Wa	iter heat	ing enei	rgy requi	rement:								kWh/ye	ear:	
۸۵۵۰۰	ad again	nonov l	N I										ı	(40)
if TF	ed occu A > 13.9 A £ 13.9	0, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		34		(42)
		•	ater usag	ge in litre	es per da	y Vd,av	erage =	(25 x N)	+ 36		89	.76	ı	(43)
		Ū		0,		Ū	Ū	to achieve	a water us	se target o	f			
not more			person per T			not and co		ı					ı	
Hot wot	Jan	Feb	Mar day for ea	Apr	May	Jun	Jul Table 10 Y	Aug	Sep	Oct	Nov	Dec		
								. /				1	ı	
(44)m=	98.73	95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14	98.73		
Energy o	content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1077.07	(44)
(45)m=	146.42	128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8	ı	
If instan	taneous w	ater heati	na at noint	of use (no	hot water	· storage)	enter∩in	boxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1412.21	(45)
			· ·						` '	47.04	40.50	04.07	ı	(46)
(46)m= Water	^{21.96} storage	19.21 loss:	19.82	17.28	16.58	14.31	13.26	15.21	15.4	17.94	19.59	21.27		(40)
	_		includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	ı	(47)
If com	nunity h	eating a	ınd no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherv	ise if no	stored	hot wate	er (this in	icludes i	nstantar	eous co	mbi boil	ers) ente	er '0' in (47)			
	storage												ı	
,			eclared I		or is kno	wn (kWr	n/day):					0	ı	(48)
•			m Table									0	ı	(49)
			storage eclared o	-		or is not		(48) x (49)) =			0		(50)
			factor fr	-								0	ı	(51)
		_	ee secti		`		,					<u> </u>		, ,
Volum	e factor	from Ta	ble 2a									0	ı	(52)
Tempe	erature fa	actor fro	m Table	2b								0		(53)
٠.			storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	ı	(54)
	(50) or (, ,	,									0		(55)
Water	storage	loss cal	culated t	or each	month			((56)m = (55) × (41)ı	n	_			
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	ı	(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	x H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)

Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m	0	(58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo	stat)	
(59)m= 0 0 0 0 0 0 0 0 0	0 0	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 x (41)m		
(61)m= 36.4 32.86 36.36 35.17 36.32 35.13 36.29 36.31 35.15 36.35	35.2 36.39	(61)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	(46)m + (57)m +	(59)m + (61)m
(62)m= 182.81 160.92 168.51 150.37 146.86 130.52 124.68 137.74 137.79 155.97	165.78 178.19	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	ion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater		
(64)m= 182.81 160.92 168.51 150.37 146.86 130.52 124.68 137.74 137.79 155.97	165.78 178.19	
Output from water heate	r (annual) ₁₁₂	1840.15 (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= 57.78 50.79 53.03 47.1 45.84 40.5 38.46 42.8 42.92 48.86	52.22 56.25	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is fi	<u> </u>	eating
	Om community in	Saurig
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts	Nov Dee	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	(66)
(66)m= 116.96 116.9	116.96 116.96	(00)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.74 10.00	(67)
(67)m= 18.4 16.35 13.29 10.06 7.52 6.35 6.86 8.92 11.97 15.2	17.74 18.92	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5		(5.5)
(68)m= 206.45 208.59 203.19 191.7 177.19 163.56 154.45 152.3 157.7 169.2	183.7 197.34	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5		
(69)m= 34.7 34.7 34.7 34.7 34.7 34.7 34.7 34.7	34.7 34.7	(69)
Pumps and fans gains (Table 5a)		
(70)m= 3 3 3 3 3 3 3 3 3 3 3	3 3	(70)
Losses e.g. evaporation (negative values) (Table 5)		
(71)m= -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57	-93.57 -93.57	(71)
Water heating gains (Table 5)	•	
(72)m= 77.67 75.59 71.27 65.41 61.61 56.25 51.7 57.53 59.61 65.67	72.52 75.6	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (70)m$	(1)m + (72)m	
(73)m= 363.61 361.61 348.85 328.26 307.41 287.24 274.1 279.85 290.37 311.16	335.06 352.94	(73)
6. Solar gains:		
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicate	ole orientation.	
Orientation: Access Factor Area Flux g_	FF	Gains
	able 6c	(W)
Southeast 0.9x 0.77 x 15.33 x 36.79 x 0.76 x	0.7 =	207.95 (77)
Southeast 0.9x 0.77 x 15.33 x 62.67 x 0.76 x	0.7 =	354.22 (77)

					_		,							_
Southeast 0.9x	0.77	X	15.	33	X _	85.75	X		0.76	X	0.7	=	484.66	(77)
Southeast 0.9x	0.77	X	15.	33	X	106.25	X		0.76	X	0.7	=	600.51	(77)
Southeast _{0.9x}	0.77	X	15.	33	х	119.01	X		0.76	X	0.7	=	672.62	(77)
Southeast _{0.9x}	0.77	X	15.	33	X	118.15	X		0.76	X	0.7	=	667.76	(77)
Southeast 0.9x	0.77	X	15.	33	x	113.91	X		0.76	x	0.7	=	643.79	(77)
Southeast 0.9x	0.77	X	15.	33	x	104.39	X		0.76	x	0.7	=	589.99	(77)
Southeast 0.9x	0.77	X	15.	33	x	92.85	X		0.76	x	0.7	=	524.78	(77)
Southeast _{0.9x}	0.77	X	15.	33	х	69.27	X		0.76	x	0.7	=	391.49	(77)
Southeast 0.9x	0.77	X	15.	33	х	44.07	X		0.76	x	0.7	=	249.08	(77)
Southeast 0.9x	0.77	X	15.	33	х	31.49	X		0.76	x	0.7	=	177.96	(77)
Northwest _{0.9x}	0.77	X	9.1	4	х	11.28	X		0.76	x	0.7	=	38.02	(81)
Northwest 0.9x	0.77	X	9.1	4	x	22.97	X		0.76	x	0.7	=	77.39	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x $\overline{}$	41.38	X		0.76	T x	0.7	=	139.43	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x =	67.96	X		0.76	×	0.7	=	228.99	(81)
Northwest 0.9x	0.77	X	9.1	4	x =	91.35	X		0.76	x	0.7	=	307.81	(81)
Northwest _{0.9x}	0.77	X	9.1	4	х 🗀	97.38	j×		0.76	×	0.7	_ =	328.16	(81)
Northwest _{0.9x}	0.77	X	9.1	4	х	91.1	j×		0.76	×	0.7		306.98	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x $\overline{}$	72.63	X		0.76	×	0.7	-	244.73	(81)
Northwest 0.9x	0.77	x	9.1	4	x $\overline{}$	50.42	X		0.76	T x	0.7	-	169.9	(81)
Northwest _{0.9x}	0.77	x	9.1	4	x –	28.07	X		0.76	T x	0.7	-	94.58	(81)
Northwest _{0.9x}	0.77	x	9.1	4	x 📙	14.2	X		0.76	×	0.7	=	47.84	(81)
Northwest _{0.9x}	0.77	X	9.1	4	x \vdash	9.21] x		0.76	- x	0.7		31.05	(81)
L					_		_			_ '				
Solar gains in	watts, cal	lculated	for eacl	h month			(83)m	n = Sur	m(74)m	(82)m				
(83)m= 245.97	431.61	624.09	829.5	980.43	995.	.92 950.78	834	1.72	694.68	486.06	296.92	209.01]	(83)
Total gains – i	nternal ar	nd solar	(84)m =	= (73)m -	+ (83)m , watts			·			•	_	
(84)m= 609.58	793.22	972.94	1157.77	1287.84	1283	3.16 1224.87	1114	4.57	985.05	797.22	631.98	561.95		(84)
7. Mean inter	rnal tempe	erature	(heating	season)									
Temperature						ea from Tal	ble 9	, Th1	(°C)				21	(85)
Utilisation fac	ctor for ga	ins for I	iving are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Ju		A	ug	Sep	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.94	0.85	0.69	0.5	1 0.37	0.4	43	0.67	0.91	0.98	0.99	1	(86)
Mean interna	l temnera	nture in I	living ar	 ⊇a T1 (fo	ıllow	stens 3 to 3	7 in T	 ГаЫе	9c)				4	
(87)m= 19.56	19.85	20.23	20.63	20.88	20.9	i	20.		20.92	20.55	19.96	19.51	1	(87)
						Lina fana T						<u> </u>	J	
Temperature (88)m= 19.72	19.72	19.72	19.74	19.74	19.7	<u> </u>	19.		19.74	19.74	19.73	19.73	1	(88)
		Į			<u> </u>	ļ .	<u> </u>	.73	13.14	19.74	19.73	19.73	J	(00)
Utilisation fac	, <u> </u>	1			i –	<u>`</u>	T -				1 -		1	(00)
(89)m= 0.99	0.97	0.93	0.81	0.62	0.4	1 0.27	0.3	31	0.57	0.88	0.98	0.99	J	(89)
Mean interna	l tempera	ture in t	the rest	of dwelli	ng T	2 (follow ste	eps 3	3 to 7	in Tabl	e 9c)		,	,	
(90)m= 17.84	18.26	18.8	19.35	19.64	19.7	74 19.75	19.	.75	19.69	19.26		17.78		(90)
									fl	LA = Liv	ing area ÷ (4) =	0.2	(91)

N 4 ! - 4		4 /4-	مارين مرملة م	المنتباء المالم	II:\ £I	ΛΤ4	. /4 41	۸) T O					
Mean interr (92)m= 18.19	 	19.09	19.61	19.89	19.99	LA X 11	+ (1 – 1L 20	19.94	19.52	18.75	18.13		(92)
Apply adjus		l .								10.73	10.13		(32)
(93)m= 18.04	1	18.94	19.46	19.74	19.84	19.85	19.85	19.79	19.37	18.6	17.98		(93)
8. Space he							10100			15.5			
Set Ti to the			nperatur	re obtain	ed at ste	ep 11 of	Table 9	b. so tha	t Ti.m=(76)m an	d re-calc	ulate	
the utilisation													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation f	actor for g	ains, hm	:										
(94)m= 0.99	0.96	0.91	0.8	0.62	0.42	0.28	0.32	0.58	0.87	0.97	0.99		(94)
Useful gain	s, hmGm	, W = (94	1)m x (84	4)m	T								
(95)m= 600.7		886.47	921.46	795.79	541.02	340.08	359.38	569.03	690.16	612.61	555.87		(95)
Monthly av													<i>(</i>)
(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	_				i								(07)
` ,	1460.25			852.78	549.57	341.13	361.38	599.77	930.66	1226.03	1475.61		(97)
Space heat (98)m= 659.1	 	ament to			i e				 		604.00		
(98)m= 659.1	2 400.14	330.57	144.93	42.4	0	0	O	0	178.93	441.66	684.28	0050.00	7(00)
							1013	ll per year	(kvvn/year) = Sum(9	8)15,912 =	2956.03	(98)
Space heat	ing requir	ement in	kWh/m²	² /year								39.95	(99)
9a. Energy r	equireme	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space hea	•												_
Fraction of	space hea	at from se	econdar	y/supple	mentary	system						0	(201)
Eraction of													=
FIACION	space nea	at from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of	-		•	• •			, ,	- (201) = 02) × [1 -	(203)] =			1	(202)
	total heati	ng from	main sys	stem 1			, ,	, ,	(203)] =				╡ .
Fraction of	total heati f main spa	ng from lace heat	main sys	stem 1 em 1	g systen		, ,	, ,	(203)] =			1	(204)
Fraction of Efficiency of	total heati f main spa	ng from i	main sys	stem 1 em 1 y heating	· ·	n, %	(204) = (2	02) × [1 –	, ,,	Nov	Dec	92.9 0	(204) (206) (208)
Fraction of Efficiency of Efficiency of	total heati f main spa f seconda Feb	ng from lace heatingly	main sys ing syste ementar Apr	stem 1 em 1 y heating May	Jun		, ,	, ,	(203)] =	Nov	Dec	1 92.9	(204) (206) (208)
Fraction of Efficiency of	total heati f main spa f seconda Feb ing requir	ng from lace heatingly	main sys ing syste ementar Apr	stem 1 em 1 y heating May	Jun	n, %	(204) = (2	02) × [1 –	, ,,	Nov 441.66	Dec 684.28	92.9 0	(204) (206) (208)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1	f main sport f seconda Feb ing requir 468.14	ng from ace heatingly/supplement (compared as 336.57	main systementary Apr Alculated	stem 1 em 1 y heating May d above 42.4	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct			92.9 0	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat	f main sport f seconda Feb ing requir 2 468.14	ng from ace heatingly/supplement (compared as 336.57	main systementary Apr Alculated	stem 1 em 1 y heating May d above 42.4	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct			92.9 0	(204) (206) (208)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(9)	f main sport f seconda Feb ing requir 2 468.14	ng from acce heating/supplement (compared as 336.57	main system system alculated 144.93 00 ÷ (20	stem 1 em 1 y heating May d above 42.4	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 –	Oct 178.93	441.66 475.42	684.28 736.58	92.9 0	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(9)	f main sport f seconda Feb ing requir 468.14 08)m x (20 9 503.92	ng from acce heating/supplement (compared as 336.57 as 362.29	Apr alculated 144.93 00 ÷ (20	stem 1 em 1 y heating May d above 42.4 06) 45.64	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 178.93	441.66 475.42	684.28 736.58	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[((3709.4)	total heati f main spa f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (s	mg from acce heating many/supplement (compared as 336.57 mg/s)] } x 1 mg/s accordance ac	Apr alculated 144.93 00 ÷ (20 156.01	stem 1 em 1 y heating May d above 42.4 06) 45.64	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 178.93	441.66 475.42	684.28 736.58	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(9)	total heati f main spa f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (s	mg from acce heating many/supplement (compared as 336.57 mg/s)] } x 1 mg/s accordance ac	Apr alculated 144.93 00 ÷ (20 156.01	stem 1 em 1 y heating May d above 42.4 06) 45.64	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 178.93	441.66 475.42	684.28 736.58	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(98)m x (98)m x (98	total heating f main sport f secondar Febring requir 468.14 28)m x (20) 503.92 ing fuel (secondary) } x 1	mg from acce heating/supplement (compared as 336.57 as 362.29 as condared as 300 ÷ (20	main systementary Apr alculated 144.93 00 ÷ (20 156.01	stem 1 em 1 y heating May d above 42.4 06) 45.64 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 lt (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 =	1 92.9 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(98)m x (98)m x (98	total heati f main sport f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (second) } x 1 0	mg from acce heating/supplement (compared as 336.57 as 362.29 as condared as 300 ÷ (20	main systementary Apr alculated 144.93 00 ÷ (20 156.01	stem 1 em 1 y heating May d above 42.4 06) 45.64 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(98)m x (915)m=0]}	total heati f main spa f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (s 201)]} x 1 0	mg from acce heating many/supplement (compared as 336.57 as 362.29 as condary on the condary of	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/8) 0	stem 1 em 1 y heating May d above 42.4 06) 45.64 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(() 709.4)] Space heat = {[(98)m x (() (215)m= 0] Water heati	total heati f main sport f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (seconda) 0 0 ing water hea	mg from acce heating mary/supplement (compared as 336.57 and 362.29 accordant to 00 ÷ (20 accordant to 00 ± (2	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/8) 0	stem 1 em 1 y heating May d above 42.4 06) 45.64 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(98)m x (915)m=0]} Water heati Output from	total heati f main spa f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (s 201)] } x 1 0 ng water hea 1 160.92	mg from ace heating mary/supplement (c 336.57 a) 362.29 accondary 00 ÷ (20 a) 0	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/ 8) 0	stem 1 em 1 y heating May d above 42.4 06) 45.64 month 0	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 = 0	1 92.9 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[((3) 709.4)] Space heat = {[(98)m x ((215)m=0)] Water heati Output from 182.8	total heati f main sport f seconda Feb ing requir 2 468.14 08)m x (20 9 503.92 ing fuel (secondary)	mg from ace heating mary/supplement (c 336.57 a) 362.29 accondary 00 ÷ (20 a) 0	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/ 8) 0	stem 1 em 1 y heating May d above 42.4 06) 45.64 month 0	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 178.93 192.6 ar) =Sum(2	441.66 475.42 211) _{15,1012}	736.58 = 0	1 92.9 0 kWh/ye	(204) (206) (208) (211) (211) (215)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(9) 709.4] Space heat = {[(98)m x (215)m= 0] Water heati Output from 182.8 Efficiency of (217)m= 89.62 Fuel for water	total heati f main spa f seconda Feb ing requir 2 468.14 28)m x (20 9 503.92 ing fuel (s 201)] } x 1 0 ng water heati 1 160.92 water heating.	mg from ace heatingly supplied ary/supplied	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/8) 0 ulated al 150.37 88.47 onth	May dabove 42.4 Mo) 45.64 month o oove) 146.86	Jun 0 0 0 130.52	o 0 124.68	(204) = (2 Aug 0 Tota 137.74	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 178.93 192.6 ar) =Sum(2 0 155.97	441.66 475.42 211) _{15,1012} 0 215) _{15,1012}	736.58 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(98)m x (215)m=0] Water heati Output from 182.8 Efficiency of (217)m=89.62 Fuel for wate (219)m = (6	total heating f main sport f secondar Febring requir 2 468.14 28 7	mg from ace heatingly/supplement (color) Mar Sement (color) 336.57 362.29 362.29 00 ÷ (20 168.51	main system system alculated 144.93 and 156.01 and 150.37 and 150.	May dabove 42.4 (2.6) 45.64 (2.6) 146.86 (2.4) (Jun 0 0 130.52 86.6	0 0 124.68 86.6	O Total 137.74	02) × [1 – Sep 0 0 0 I (kWh/yea 137.79 86.6	Oct 178.93 192.6 ar) =Sum(2 0 155.97	441.66 475.42 211) _{15,1012} 0 215) _{15,1012} 165.78	684.28 736.58 0 178.19 89.67	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency of Efficiency of Jan Space heat 659.1 (211)m = {[(9) 709.4] Space heat = {[(98)m x (215)m= 0] Water heati Output from 182.8 Efficiency of (217)m= 89.62 Fuel for water	total heating f main sport f secondar Febring requir 2 468.14 28 7	mg from ace heatingly supplied ary/supplied	main systementary Apr alculated 144.93 00 ÷ (20 156.01 y), kWh/8) 0 ulated al 150.37 88.47 onth	May dabove 42.4 Mo) 45.64 month o oove) 146.86	Jun 0 0 0 130.52	o 0 124.68	O Total 137.74 86.6	02) × [1 – Sep 0 0 I (kWh/yea 137.79	Oct 178.93 192.6 0 ar) =Sum(2 155.97 88.64	441.66 475.42 211) _{15,1012} 0 215) _{15,1012}	736.58 = 0 =	1 92.9 0 kWh/ye	(204) (206) (208) ar (211) (211)

Annual totals Space heating fuel used, main system 1		kWh/year	kWh/year 3181.95	1
Water heating fuel used			2083.72]]
Electricity for pumps, fans and electric keep-hot			2000.72	J
			_	(000)
central heating pump:		30	_	(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75	(231)
Electricity for lighting			325.04	(232)
Electricity generated by PVs			-905.68	(233)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =		4760.02	(338)
12a. CO2 emissions – Individual heating systems	s including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/yea	r
Space heating (main system 1)	U			r](261)
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	kg CO2/yea	
	kWh/year (211) x	kg CO2/kWh	kg CO2/yea	(261)
Space heating (secondary)	kWh/year (211) x (215) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/yea	(261)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/yea 687.3 0 450.08	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	kg CO2/kWh 0.216 = 0.519 = 0.216 =	kg CO2/yea 687.3 0 450.08	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x	kg CO2/kWh 0.216 = 0.519 = 0.519 =	kg CO2/yea 687.3 0 450.08 1137.38 38.93	(261) (263) (264) (265) (267)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot Electricity for lighting Energy saving/generation technologies	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	kg CO2/kWh 0.216 = 0.519 = 0.519 = 0.519 =	kg CO2/yea 687.3 0 450.08 1137.38 38.93 168.69	(261) (263) (264) (265) (267) (268)

El rating (section 14)

(274)

		User Details:			
A NI	David David d		OTDO	20000	
Assessor Name: Software Name:	David Barsted Stroma FSAP 2012	Stroma Number: Software Version:		032333 n: 1.0.5.50	
Software Name.		Property Address: House 1	versio	11. 1.0.5.50	
Address :	9 Cheyne Avenue, London				
1. Overall dwelling dime	· ·	, IVVZ OAIV			
		Area(m²) Av. Hei	ght(m)	Volume(m ³	3)
Ground floor		37 (1a) x 2.		92.5	(3a)
First floor		37 (1b) x 2.	7 (2b) =	99.9	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+((4)			
Dwelling volume		(3a)+(3b)+(3c)+(3d)	+(3e)+(3n) =	192.4	(5)
2. Ventilation rate:			L		
	main seconda heating heating			m³ per hou	ır
Number of chimneys	0 + 0	+ 0 = 0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 = 0	x 20 =	0	(6b)
Number of intermittent fa	ns	3	x 10 =	30	(7a)
Number of passive vents		0	x 10 =	0	(7b)
Number of flueless gas fi	res	0	x 40 =	0	(7c)
			<u> </u>		_
1.60	(0-), (01)	(7-) (7) (7-)		anges per ho	_
•	ys, flues and fans = $(6a)+(6b)+$ een carried out or is intended, proce	ed to (17), otherwise continue from (9) to (17).	÷ (5) =	0.16	(8)
Number of storeys in the			- <i>,</i>	0	(9)
Additional infiltration	3 \ ,		[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry construction	Ī	0	(11)
if both types of wall are pl deducting areas of openir	resent, use the value corresponding	to the greater wall area (after			
=	loor, enter 0.2 (unsealed) or	0.1 (sealed), else enter 0	Γ	0	(12)
If no draught lobby, en		,	ļ	0	(13)
Percentage of windows	s and doors draught stripped		Ī	0	(14)
Window infiltration		$0.25 - [0.2 \times (14) \div 100] =$	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) + (12) + (13) +	(15) =	0	(16)
Air permeability value,	q50, expressed in cubic met	es per hour per square metre of er	velope area	5	(17)
	ity value, then (18) = [(17) ÷ 20]-		·	0.41	(18)
Air permeability value applie	s if a pressurisation test has been d	one or a degree air permeability is being us	ed		
Number of sides sheltere	d			1	(19)
Shelter factor		(20) = 1 - [0.075 x (19)] =		0.92	(20)
Infiltration rate incorporat	ing chalter factor	$(21) = (18) \times (20) =$		0.20	(21)
•	ing sheller factor		L	0.38	(= 1)
Infiltration rate modified f				0.36	(=1)
•		Jul Aug Sep Oct	Nov Dec	0.36	(=:)

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (2	22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltr	otion rot	o (allowi	na for ok	oltor on	d wind a	nood) –	(21a) v	(22a)m	•	•	•	•	
0.48	0.47	e (allowi	0.41	0.4	0.36	0.36	0.35	0.38	0.4	0.42	0.44	1	
Calculate effe	ctive air	change i	l '	•••			0.00	0.00	0.1	0.12	0.11		
If mechanic	al ventila	ation:										0	(23a)
If exhaust air h		0		, ,	, ,	. `	,, .	,) = (23a)			0	(23b)
If balanced with		-	-	_								0	(23c)
a) If balance	·	1	i	·	·	- 	- ` ` - 	ŕ	 		- ` 	÷ 100] I	(5.4.)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	i		i	i	i	· · · ·			- 	'	1	1	(5.41)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h				•					E (00k	. \			
(24c)m = 0	0.5 x	(23b), t	nen (240	(230) = (230)	o); otner	wise (24)	C) = (22)	0) m + 0.	5 × (231	0	0]	(24c)
			<u> </u>	<u> </u>	<u> </u>		<u> </u>		0				(240)
d) If natural if (22b)r		on or wn en (24d)							0.5]				
(24d)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6		(24d)
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)	<u> </u>	!	!	l	
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6		(25)
3. Heat losse	s and he					•		•					
		at Ince r	narameti	or.									
ELEMENT	Gros	SS	oaramet Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value		A X k kJ/K
		SS	Openin	gs	Net Ar A ,r	m²			A X U (W/				
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m² x x1/2	W/m2	eK = [0.04] = [(W/				kJ/K (26)
ELEMENT Doors Windows Type	Gros area	SS	Openin	gs	A ,r 1.89 6.2	m ² x x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	eK = [0.04] = [1.89 8.22 13.8				kJ/K (26) (27) (27)
Doors Windows Type Windows Type Floor	Gros area e 1 e 2	ss (m²)	Openin m	gs ₁ ²	A ,r 1.89 6.2 10.41 36.4	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	eK = [0.04] = [0.04] = [= [1.89 8.22 13.8 4.732				(26) (27) (27) (28)
Doors Windows Type Windows Type Floor Walls	Gros area e 1 e 2	SS (m²)	Openin m	gs ₁ ²	A ,r 1.89 6.2 10.41 36.4 69.38	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	EK	1.89 8.22 13.8 4.732 12.49				(26) (27) (27) (28) (29)
Doors Windows Type Windows Type Floor Walls Roof	Gros area 1 2 2 87.8 36.6	ss (m²)	Openin m	gs ₁ ²	A ,r 1.89 6.2 10.41 36.4 69.38	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	eK = [0.04] = [0.04] = [= [1.89 8.22 13.8 4.732				(26) (27) (27) (28) (29) (30)
Doors Windows Type Windows Type Floor Walls Roof Total area of e	Gros area 1 2 2 87.8 36.6	ss (m²)	Openin m	gs ₁ ²	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	EK	1.89 8.22 13.8 4.732 12.49				(26) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area 1 1 2 2 87.8 36.6 Selements	38 (m²) 38 34 34 34 35, m²	Openin m	gs 5 indow U-ve	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	eK = [0.04] = [0.04] = [1.89 8.22 13.8 4.732 12.49 4.76	k)	kJ/m²-		(26) (27) (27) (28) (29) (30)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area	Gros area 1 1 2 2 87.8 36.6 Selements	38 64 64 64 60 60 60 60 60 60 60 60 60 60	Openin m 18.5 0 effective winternal wal	gs 5 indow U-ve	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x x x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	EK	1.89 8.22 13.8 4.732 12.49 4.76	k)	kJ/m²-	X	kJ/K (26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los	Gros area 1 1 2 2 87.8 36.6 Relements 1 roof wind as on both ss, W/K:	38 (m²) 38 34 34 35, m² 36 36 37 38 38 38 39 39 39 39 39 39 39 39 39 39 39 39 39	Openin m 18.5 0 effective winternal wal	gs 5 indow U-ve	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul	x1/2 x x1/2 x x1/2 x x x x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	$ \begin{array}{ccc} 2K & = & & \\ 0.04] & = & & \\ 0.04] & = & & \\ 0.04] & = & & \\ & = & & \\ & = & & \\ & = & & \\ & & & $	1.89 8.22 13.8 4.732 12.49 4.76 0 1e)+0.04] &	K)	kJ/m²-	3.2	(26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat los Heat capacity	Gros area 1 1 2 2 87.8 36.6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	38 38 34 34 35, m ² 36 ows, use e 36 sides of int 36 = S (A x 37 (A x k)	18.5 0 internal wall	gs g2 indow U-va ls and pan	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions	x x x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	$ \begin{array}{ccc} 2K & = & & \\ 0.04] & = & & \\ 0.04] & = & & \\ 0.04] & = & & \\ & = & \\ & = & & \\ & = & & \\ & = & & \\ & = & & \\ & = & & \\ & = & \\$	1.89 8.22 13.8 4.732 12.49 4.76 0 1e)+0.04] &	K)	kJ/m²-	7 3.2 45.89	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (34)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design asses	Gros area 1 1 2 2 87.8 36.6 8 8 8 8 9 8 9 8 9 8 9 8 9 8 9 8 9 8 9	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	18.5 18.5 0 effective winternal wall U) P = Cm = tails of the	gs indow U-va ls and pan	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculations	x1/2 x x1/2 x x1/2 x x x x x1/2 x x x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13 (26)(30)	2K $= [$ $0.04] = [$ $0.04] = [$ $0.04] = [$ $= [$	(W// 1.89 8.22 13.8 4.732 12.49 4.76 0 (a) (a) + (a) (a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	K)	paragraph(32e) =	3.2	(26) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are. Fabric heat los Heat capacity Thermal mass For design asses can be used inste	Gros area 1 1 2 2 87.8 36.6 1 roof winders on both as on both	ss (m²) 38 34 34 35, m² 364 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 364 365 366 367 368 368 368 368 368 368	Openin m 18.5 0 offective winternal wall U) P = Cm - tails of the culation.	gs indow U-va ls and pan	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calcul titions	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13 (26)(30)	2K $= [$ $0.04] = [$ $0.04] = [$ $0.04] = [$ $= [$	(W// 1.89 8.22 13.8 4.732 12.49 4.76 0 (a) (a) + (a) (a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	K)	paragraph(32e) =	7 3.2 45.89 11221.6 250	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design asses	Gros area 2 1 2 2 87.8 36.6 8 1 roof winders on both ss, W/K: Cm = S(1 parameters who ad of a deces: S (L	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	Openin m 18.5 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs indow U-vals and pan constructions	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13 (26)(30)	2K $= [$ $0.04] = [$ $0.04] = [$ $0.04] = [$ $= [$	(W// 1.89 8.22 13.8 4.732 12.49 4.76 0 (a) (a) + (a) (a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	K)	paragraph(32e) =	7 3.2 45.89	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (34)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design asses can be used inste	Gros area 2 1 2 2 87.8 36.6 Selements 1 roof winder as on both as, W/K: Cm = S(a parame sments whe ad of a de es: S (L al bridging	SS (m²) 38 34 34 34 35 36 37 38 38 38 38 38 38 38 38 38	Openin m 18.5 0 effective winternal wall U) P = Cm = tails of the culation. culated to	gs indow U-vals and pan constructions	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13 (26)(30)	eK = [0.04] = [0.04] = [(W// 1.89 8.22 13.8 4.732 12.49 4.76 0 (a) (a) + (a) (a) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	K)	paragraph(32e) =	7 3.2 45.89 11221.6 250	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (34) (35)
ELEMENT Doors Windows Type Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of therm	Gros area e 1 e 2 87.8 36.6 elements I roof wind as on both as on both cs, W/K: Cm = S(parame sments wh ad of a de es : S (L al bridging at loss	SS (m²) 38 34 34 34 35 36 37 38 38 38 39 30 30 30 30 30 30 30 30 30	Openin m 18.5 0 effective win sternal walk U) P = Cm - tails of the culation. culated to cown (36) =	gs indow U-va is and pan construction using Ap = 0.05 x (3)	A ,r 1.89 6.2 10.41 36.4 69.38 36.64 160.9 38.93 alue calculatitions n kJ/m²K ion are not opendix k	x1/x1/x x x x x x x x x x x x x x x x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13 (26)(30)	2K $= [$ $0.04] = [$ $0.04]$	(W// 1.89 8.22 13.8 4.732 12.49 4.76 0 (a) + (3.0) + (K)	paragraph(32e) =	7.11	(26) (27) (27) (28) (29) (30) (31) (32) (33) (36) (36)

			•	•					•	•	•	•	
(38)m= 39.0	38.74	38.46	37.16	36.92	35.79	35.79	35.58	36.22	36.92	37.41	37.93		(38)
Heat transfe	er coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 92.0	91.74	91.46	90.16	89.92	88.79	88.79	88.58	89.22	89.92	90.41	90.93		
Heat loss pa	arameter (I	HLP), W	/m²K		_	_	-		Average = = (39)m ÷	Sum(39)₁ - (4)	12 /12=	90.16	(39)
(40)m= 1.24	4 1.24	1.24	1.22	1.22	1.2	1.2	1.2	1.21	1.22	1.22	1.23		_
Number of o	davs in mo	nth (Tah	le 1a)					,	Average =	Sum(40)₁	12 /12=	1.22	(40)
Ja	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	_	31	30	31	30	31	31	30	31	30	31		(41)
		!			<u> </u>	<u> </u>	!		<u> </u>	!	!	l	
4. Water h	eating ene	rgy requ	irement:								kWh/ye	ear:	
												ı	
	ccupancy, 3.9, N = 1 3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13		.34		(42)
Annual ave	,	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		89	9.76		(43)
Reduce the an	•		• .		-	-	to achieve	a water us	se target o	f	<u> </u>		
			· ·			<u> </u>	Ι.					Ī	
Ja Hot water usag		Mar day for ea	Apr ach month	May	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
			1	1	1	1	· <i>'</i>	07.06	04.55	T 05 44	00.72		
(44)m= 98.7	73 95.14	91.55	87.96	84.37	80.78	80.78	84.37	87.96	91.55	95.14 m(44) ₁₁₂ =	98.73	1077.07	(44)
Energy conten	nt of hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	m x nm x C	OTm / 3600			· /		1077.07	(++)
(45)m= 146.	42 128.06	132.14	115.21	110.54	95.39	88.39	101.43	102.64	119.62	130.57	141.8		_
If instantaneou	ıs water heati	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1412.21	(45)
(46)m= 21.9	96 19.21	19.82	17.28	16.58	14.31	13.26	15.21	15.4	17.94	19.59	21.27		(46)
Water stora								1011					, ,
Storage vol	ume (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If communit				_			` '						
Otherwise if Water stora		hot wate	er (this ir	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
a) If manuf	ŭ	eclared I	oss facto	or is kno	wn (kWh	n/dav):					0		(48)
Temperatur					`	, , ,					0		(49)
Energy lost				ear			(48) x (49)) =			0		(50)
b) If manuf	acturer's d	eclared o	cylinder l	oss fact									` '
Hot water s	•			e 2 (kW	h/litre/da	ay)					0		(51)
If communit			on 4.3									1	(50)
Temperatur			2h								0		(52) (53)
Energy lost				oor			(47) x (51)	v (52) v (53) -				(54)
Enter (50)		_	, KVVII/ yV	Jai			(41) X (01)	/ X (OZ) X (00) =		0		(55)
Water stora	, , ,	•	for each	month			((56)m = (55) × (41)ı	m		<u>-</u>		` '
(56)m= 0	-	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder cont						-	_		_		_	l lix H	· -/
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
	-						-		_			•	

Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss (arindar) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m	(66)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermos	stat)
(59)m= 0 0 0 0 0 0 0 0 0 0	0 0 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 50.31 43.79 46.65 43.38 42.99 39.84 41.16 42.99 43.38 46.65	46.92 50.31 (61)
Total heat required for water heating calculated for each month (62) m = $0.85 \times (45)$ m + (45) m + $(45$	(46)m + (57)m + (59)m + (61)m
(62)m= 196.73 171.85 178.8 158.58 153.54 135.23 129.56 144.43 146.02 166.27	177.49 192.11 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution	on to water heating)
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0 (63)
Output from water heater	
(64)m= 196.73 171.85 178.8 158.58 153.54 135.23 129.56 144.43 146.02 166.27	177.49 192.11
Output from water heater	(annual) ₁₁₂ 1950.6 (64)
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m -	+ (57)m + (59)m]
(65)m= 61.26 53.53 55.6 49.15 47.5 41.68 39.68 44.47 44.97 51.44	55.15 59.73 (65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from	om 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= 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96 116.96	116.96 116.96 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 18.4 16.35 13.29 10.06 7.52 6.35 6.86 8.92 11.97 15.2	17.74 18.91 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 206.45 208.59 203.19 191.7 177.19 163.56 154.45 152.3 157.7 169.2	183.7 197.34 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 34.7 34.7 34.7 34.7 34.7 34.7 34.7 34.7	34.7 34.7 (69)
Pumps and fans gains (Table 5a)	
(70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57 -93.57	-93.57 -93.57 (71)
Water heating gains (Table 5)	()
(72)m= 82.34 79.65 74.73 68.26 63.85 57.88 53.34 59.78 62.46 69.14	76.59 80.28 (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (71)m$	
	339.13 357.62 (73)
(73)m= 368.28 365.68 352.3 331.11 309.65 288.88 275.73 282.09 293.23 314.62 6. Solar gains:	339.13 357.62 (73)
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable	le orientation
Orientation: Access Factor Area Flux g_	FF Gains
0 —	able 6c (W)
Southeast 0.9x 0.77 x 10.41 x 36.79 x 0.63 x	0.7 = 117.06 (77)
Southeast 0.9x 0.77 x 10.41 x 62.67 x 0.63 x	0.7 = 199.39 (77)
0.77	0.1

О-11114 Г		_			_		7							– , .
Southeast 0.9x	0.77	X	10.	41	x _	85.75	X		0.63	X	0.7	=	272.82	(77)
Southeast 0.9x	0.77	X	10.	41	х	106.25	X	().63	X	0.7	=	338.03	(77)
Southeast _{0.9x}	0.77	X	10.	41	х	119.01	X).63	X	0.7	=	378.62	(77)
Southeast _{0.9x}	0.77	X	10.	41	x	118.15	X	(0.63	X	0.7	=	375.89	(77)
Southeast _{0.9x}	0.77	X	10.	41	x	113.91	X	(0.63	x	0.7	=	362.39	(77)
Southeast _{0.9x}	0.77	X	10.	41	x	104.39	X	().63	x	0.7	=	332.11	(77)
Southeast 0.9x	0.77	X	10.	41	x	92.85	X	(0.63	x	0.7	=	295.4	(77)
Southeast _{0.9x}	0.77	х	10.	41	х	69.27	X	(0.63	х	0.7	=	220.37	(77)
Southeast _{0.9x}	0.77	Х	10.	41	x	44.07	X	().63	х	0.7	=	140.21	(77)
Southeast 0.9x	0.77	х	10.	41	x	31.49	X	(0.63	x	0.7	=	100.18	(77)
Northwest _{0.9x}	0.77	х	6.2	2	x	11.28	X		0.63	x	0.7		21.38	(81)
Northwest _{0.9x}	0.77	x	6.2	2	x	22.97	X	(0.63	x	0.7	=	43.52	(81)
Northwest _{0.9x}	0.77	x	6.2	2	х 📃	41.38	X	(0.63	x	0.7	=	78.4	(81)
Northwest _{0.9x}	0.77	х	6.3	2	х 🗔	67.96	X		0.63	x	0.7	=	128.76	(81)
Northwest _{0.9x}	0.77	х	6.3	2	х	91.35	X	(0.63	x	0.7	=	173.08	(81)
Northwest _{0.9x}	0.77	x	6.2	2	х 🗔	97.38	X	(0.63	×	0.7	=	184.52	(81)
Northwest _{0.9x}	0.77	x	6.3	2	x	91.1	X		0.63	x	0.7	=	172.62	(81)
Northwest _{0.9x}	0.77	x	6.3	2	х	72.63	X		0.63	×	0.7	=	137.61	(81)
Northwest 0.9x	0.77	x	6.3	2	x	50.42	j x		0.63	×	0.7	_ =	95.54	(81)
Northwest _{0.9x}	0.77	x	6.3	2	x	28.07	X		0.63	×	0.7		53.18	(81)
Northwest _{0.9x}	0.77	x	6.3	2	x	14.2	X		0.63	×	0.7		26.9	(81)
Northwest 0.9x	0.77	x	6.:	2	x 🗀	9.21	X		0.63	T x	0.7	=	17.46	(81)
L					<u> </u>		_							_
Solar gains in	watts, cal	culated	for eacl	n month			(83)m	n = Sum	n(74)m	(82)m				
(83)m= 138.44	242.91	351.22	466.79	551.71	560.4	1 535.01	469).72 3	390.94	273.55	167.11	117.64]	(83)
Total gains – i	nternal an	d solar	(84)m =	= (73)m ·	+ (83)r	n , watts					_	_	_	
(84)m= 506.71	608.58	703.52	797.91	861.36	849.2	9 810.75	751	.81 6	84.17	588.17	506.23	475.25		(84)
7. Mean inter	nal tempe	erature	(heating	season)									
Temperature	during he	ating p	eriods ir	the livii	ng are	a from Ta	ble 9	, Th1	(°C)				21	(85)
Utilisation fac	ctor for gai	ins for li	iving are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Jur	Jul	А	ug	Sep	Oct	Nov	Dec]	
(86)m= 1	0.99	0.98	0.93	0.82	0.63	0.47	0.5	53	0.78	0.96	0.99	1		(86)
Mean interna	l tempera	ture in I	iving ar	ea T1 (fo	ollow s	teps 3 to	7 in T	 Γable [©]	9c)		•	•	•	
(87)m= 19.71	19.91	20.2	20.56	20.83	20.96	-i	20.		20.9	20.53	20.05	19.68]	(87)
			orioda :-	root of	dwall:	ag from T	able (ı	J	
Temperature (88)m= 19.89	19.89	19.89	19.91	19.91	19.92	<u> </u>	19.	1	19.92	19.91	19.9	19.9	1	(88)
					<u> </u>		<u> </u>		10.02	10.91	10.9	10.9	J	(55)
Utilisation fac	т <u>т</u>	1			`	1	T –	44 1	0.7		0.00		1	(00)
(89)m= 1	0.99	0.97	0.9	0.76	0.54	0.36	0.4	41	0.7	0.94	0.99	1	J	(89)
Mean interna			he rest	of dwelli	ng T2	(follow ste	eps 3	3 to 7 i	n Table	e 9c)	-1	1	1	
(90)m= 18.19	18.47	18.9	19.41	19.75	19.9	19.92	19.	.92	19.84	19.38		18.15		(90)
									fl	LA = Liv	ring area ÷ (4) =	0.2	(91)

Mara Patawal		/					. /4 (1	A) TO					
Mean internal (92)m= 18.5	tempera 18.76	19.16	r the wh	ole dwel	ling) = fi 20.11	LA × 11 20.14	+ (1 – fL 20.13	A) × 12	19.62	18.97	18.46		(92)
` '										16.97	10.40		(92)
Apply adjustm (93)m= 18.5	18.76	19.16	19.64	19.97	20.11	20.14	20.13	20.05	19.62	18.97	18.46		(93)
				19.91	20.11	20.14	20.13	20.03	19.02	10.97	10.40		(00)
Set Ti to the m	8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a												
Jan	Feb	Mar			Jun	Jul	Λιια	Sep	Oct	Nov	Dec		
Utilisation fact			Apr	May	Jun	Jui	Aug	Sep	Oct	NOV	Dec		
(94)m= 0.99	0.98	0.96	0.9	0.76	0.56	0.38	0.44	0.71	0.93	0.99	0.99		(94)
Useful gains, h		W = (94	1)m x (84	1)m		<u> </u>		<u> </u>					
	598.76	676.01	715.75	656.39	474.64	311.98	327.37	486.04	547.36	498.83	472.73		(95)
Monthly avera	ige exter	nal tem	perature	from Ta	able 8			!					
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	for mea	n intern	al tempe	erature, l	_m , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1306.28	1271.91	1157.98	968.5	743.72	489.49	313.9	330.8	531.28	810.75	1073.43	1296.6		(97)
Space heating	require	ment fo	r each m	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4 ⁻				
(98)m= 597.52	452.36	358.58	181.98	64.97	0	0	0	0	195.96	413.71	612.96		_
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2878.05	(98)
Space heating	g require	ment in	kWh/m²	/year								38.89	(99)
9a. Energy requ	uiremen	ts – Indi	vidual h	eating sy	/stems i	ncluding	micro-C	CHP)					
Space heating								,					
Fraction of spa	ace heat	from se	econdary	y/supple	mentary	system						0	(201)
Fraction of space heat from main system(s) (202) = 1 - (201) =													
i idollori di ape	ace near	t from m	iain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of total			•	. ,			. ,	- (201) = 02) × [1 -	(203)] =			1	(202)
Fraction of total	al heatin	ıg from ı	main sys	stem 1			. ,	, ,	(203)] =			1	(204)
Fraction of total	al heatin nain spa	g from i ce heati	main sys	stem 1 em 1	a svstem		. ,	, ,	(203)] =			1 93.4	(204)
Fraction of total	al heatin nain spa econdar	ig from i ce heati y/supple	main sys	stem 1 em 1 y heating		ո, %	(204) = (2	02) × [1 –		Nov	Dec	93.4	(204) (206) (208)
Fraction of total Efficiency of m	al heatin nain spa econdar Feb	ng from n ce heati y/supple Mar	main sysing systementary	stem 1 em 1 y heating May	Jun		. ,	, ,	(203)] =	Nov	Dec	1 93.4	(204) (206) (208)
Fraction of total	al heatin nain spa econdar Feb	ng from n ce heati y/supple Mar	main sysing systementary	stem 1 em 1 y heating May	Jun	ո, %	(204) = (2	02) × [1 –		Nov 413.71	Dec 612.96	93.4	(204) (206) (208)
Efficiency of m Efficiency of so Jan Space heating	al heatin nain spa econdar Feb g require	g from r ce heati y/supple Mar ment (c	main systementary Apr Alculated	em 1 em 1 y heating May d above) 64.97	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct			93.4	(204) (206) (208) ar
Fraction of total Efficiency of m Efficiency of so Jan Space heating	al heatin nain spa econdar Feb g require	g from r ce heati y/supple Mar ment (c	main systementary Apr Alculated	em 1 em 1 y heating May d above) 64.97	Jun	n, % Jul	(204) = (2 Aug	02) × [1 –	Oct	413.71		93.4	(204) (206) (208)
Fraction of total Efficiency of m Efficiency of so Jan Space heating 597.52 (211)m = {[(98)]	al heatin nain spa econdar Feb g require 452.36 m x (204	g from received the second sec	main system system alculated 181.98	stem 1 em 1 y heating May d above) 64.97	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 195.96	413.71 442.95	612.96 656.28	93.4	(204) (206) (208) ar
Fraction of total Efficiency of management of Services Fraction of total Efficiency of Services Fraction of Services Fraction of total Efficiency of Services Fraction of Service	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	ment (c. 358.58 4)] } x 1	Apr alculated 181.98 00 ÷ (20	stem 1 em 1 y heating May d above) 64.97 66) 69.56	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 –	Oct 195.96	413.71 442.95	612.96 656.28	1 93.4 0 kWh/ye	(204) (206) (208) ar
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 597.52 (211)m = {[(98)] 639.74	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	ment (c 358.58 4)] } x 1 383.92	main systementary Apr alculated 181.98 00 ÷ (20 194.84	stem 1 em 1 y heating May d above) 64.97 66) 69.56	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 195.96	413.71 442.95	612.96 656.28	1 93.4 0 kWh/ye	(204) (206) (208) ar
Fraction of total Efficiency of management of Services Fraction of total Efficiency of Services Fraction of Services Fraction of total Efficiency of Services Fraction of Service	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	ment (c 358.58 4)] } x 1 383.92	main systementary Apr alculated 181.98 00 ÷ (20 194.84	stem 1 em 1 y heating May d above) 64.97 66) 69.56	Jun 0	n, % Jul o	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 195.96	413.71 442.95	612.96 656.28	1 93.4 0 kWh/ye	(204) (206) (208) ar
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 597.52 (211)m = {[(98)(639.74)] Space heating = {[(98)m x (20)(98)m x (20)(20)(20)(20)(20)(20)(20)(20)(20)(20)	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	g from received heating y/supplement (constant) of the secondary of the se	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8	month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012}	612.96 656.28 =	1 93.4 0 kWh/ye	(204) (206) (208) ar
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 597.52 (211)m = {[(98)(639.74)] Space heating = {[(98)m x (20)(98)m x (20)(20)(20)(20)(20)(20)(20)(20)(20)(20)	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	g from received heating y/supplement (constant) of the secondary of the se	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8	month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012}	612.96 656.28 =	1 93.4 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 597.52 (211)m = {[(98)m 639.74]} Space heating = {[(98)m x (207)(215)m= 0]}	al heatin nain spa econdar Feb g require 452.36 m x (204 484.32	ment (compositions) 358.58 4)] } x 1 383.92 econdary 0 ÷ (20	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8 0	stem 1 em 1 y heating May d above) 64.97 66) 69.56 month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012}	612.96 656.28 =	1 93.4 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 639.74 Space heating 639.74 Space heating = {[(98)m x (2000)(215)m= 0]} Water heating Output from wa 196.73	al heatinnain spa econdar Feb grequire 452.36 m x (204 484.32 g fuel (se 1)] } x 10 0	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8 0	stem 1 em 1 y heating May d above) 64.97 66) 69.56 month	Jun 0 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012}	612.96 656.28 =	1 93.4 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of total Efficiency of modern Efficiency of services and services and services are services as a service of the Efficiency of services and services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of modern and services are services as a service of the Efficiency of modern and services are services as a service of services are services as a services are services as a services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of services are services as a service of the Efficiency of the Efficien	al heatinnain spa econdar Feb grequire 452.36 m x (204 484.32 g fuel (se 1)] } x 10 0	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 64.97 06) 69.56 month 0	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012} 0	612.96 656.28 = 0	1 93.4 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of total Efficiency of modern Efficiency of second Jan Space heating 639.74 Space heating 639.74 Space heating = {[(98)m x (2000)(215)m= 0]} Water heating Output from wa 196.73	al heatinnain spa econdar Feb grequire 452.36 m x (204 484.32 g fuel (se 1)] } x 10 0	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 64.97 06) 69.56 month 0	Jun 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 195.96 209.81 ar) =Sum(2	413.71 442.95 211) _{15,1012} 0	612.96 656.28 = 0	1 93.4 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of total Efficiency of modern Efficiency of services and services and services are services as a service of the Efficiency of services and services are services as a services are services are services as a services are services as a services are services are services as a services are services as a services are services are services as a services are services are services are services as a services are services are services are services as a services are servic	al heating along require 452.36 m x (204484.32 m) x (10) m x (171.85 m) atter heat 87.37 meating,	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8 0 ulated al 158.58 85.4 onth	May dabove) 64.97 69.56 month 0	Jun 0 0 0 135.23	o 0 129.56	(204) = (2 Aug 0 Tota 144.43	02) × [1 – Sep 0 0 I (kWh/yea 146.02	Oct 195.96 209.81 ar) =Sum(2 0 166.27	413.71 442.95 211) _{15,1012} 0 215) _{15,1012}	612.96 656.28 = 0 =	1 93.4 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of total Efficiency of moderate Efficiency of second Space heating Space heating (211)m = {[(98)m x (20) (215)m = 0} Water heating Output from water heating (217)m = 87.67 Fuel for water heating (219)m = (64)m	al heating nain spanecondar Feb grequire 452.36 mx (204484.32 green full (set 1)] } x 10 green full full full full full full full ful	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh// 8) 0 ulated alculated alculate	stem 1 em 1 y heating May d above) 64.97 66) 69.56 month 0 cove) 153.54	Jun 0 0 0 135.23 80.3	o 0 129.56 80.3	(204) = (2 Aug 0 Tota 144.43 80.3	02) × [1 – Sep 0 0 I (kWh/yea 146.02	Oct 195.96 209.81 ar) =Sum(2 0 166.27 85.47	413.71 442.95 211) _{15,1012} 0 215) _{15,1012} 177.49	612.96 656.28 = 0 = 192.11	1 93.4 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of total Efficiency of modern Efficiency of services and services and services are services as a service of the Efficiency of services and services are services as a services are services are services as a services are services as a services are services are services as a services are services as a services are services are services as a services are services are services are services as a services are services are services are services as a services are servic	al heating along require 452.36 m x (204484.32 m) x (10) m x (171.85 m) atter heat 87.37 meating,	ment (c 358.58 4)] } x 1 383.92 econdary 00 ÷ (20 0	main systementary Apr alculated 181.98 00 ÷ (20 194.84 y), kWh/8 0 ulated al 158.58 85.4 onth	May dabove) 64.97 69.56 month 0	Jun 0 0 0 135.23	o 0 129.56	O Tota 144.43 80.3	02) × [1 – Sep 0 0 I (kWh/yea 146.02	Oct 195.96 209.81 0 ar) =Sum(2 166.27 85.47	413.71 442.95 211) _{15,1012} 0 215) _{15,1012}	612.96 656.28 = 0 =	1 93.4 0 kWh/ye	(204) (206) (208) ar (211) (211)

Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot		kWh/year	kWh/year 3081.43 2306.33
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			325 (232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b)	=	5787.76 (338)
12a. CO2 emissions – Individual heating system	s including micro-CHF		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	665.59 (261)
Space heating (secondary)	(215) x	0.519	0 (263)
Water heating	(219) x	0.216	498.17 (264)
Space and water heating	(261) + (262) + (263) + ((264) =	1163.76 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	38.93 (267)
Electricity for lighting	(232) x	0.519	168.68 (268)
Total CO2, kg/year		sum of (265)(271) =	1371.36 (272)
TER =			18.53 (273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 30 November 2021

Property Details: House 1

Dwelling type: End-terrace House

Located in:EnglandRegion:Thames valley

Cross ventilation possible: Yes Number of storeys: 2

Front of dwelling faces: North West

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation:FalseBlinds, curtains, shutters:None

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 507.94 (P1)

Transmission heat loss coefficient: 69.2

Summer heat loss coefficient: 577.1 (P2)

Overhangs:

Orientation: Ratio: Z_overhangs:

North West (Windows NVV) 1 South East (Windows SE) 1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North West (Windows	NVV)	0.9	1	0.9	(P8)
South East (Windows S	SE)1	0.9	1	0.9	(P8)

Solar gains:

Orientation	Area	Flux	g _	FF	Shading	Gains
North West (Windows NW)9 x	9.14	98.85	0.76	0.7	0.9	389.31
South East (Windows SE)0.9 x	15.33	119.92	0.76	0.7	0.9	792.21
					Total	1181 52 (P3/P4)

Internal gains.

	June	July	August
Internal gains	414.4	397.53	405.31
Total summer gains	1666.31	1579.05	1462.85 (P5)
Summer gain/loss ratio	2.89	2.74	2.53 (P6)
Mean summer external temperature (Thames valley)	16	17.9	17.8
Thermal mass temperature increment	0.25	0.25	0.25
Threshold temperature	19.14	20.89	20.58 (P7)
Likelihood of high internal temperature	Not significant	Slight	Slight

Assessment of likelihood of high internal temperature: Slight