### **Regulations Compliance Report**

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.8 Printed on 07 October 2020 at 14:40:25

Project Information:

Assessed By: John Ashe (STRO031268) **Building Type:** 

Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** 

Total Floor Area: 57.39m<sup>2</sup>

Site Reference : COPPETTS WOOD, London Plot Reference: Unit 3 - COPPETTS WOOD, Lor

Address:

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 (c), Mains gas (c)

Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 16.56 kg/m<sup>2</sup>

Dwelling Carbon Dioxide Emission Rate (DER) 8.70 kg/m<sup>2</sup> OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 35.6 kWh/m<sup>2</sup>

Dwelling Fabric Energy Efficiency (DFEE) 28.3 kWh/m<sup>2</sup>

OK

OK

2 Fabric U-values

**Element Average Highest** External wall 0.15 (max. 0.30) 0.15 (max. 0.70)

Floor (no floor)

Roof (no roof)

**Openings** 0.90 (max. 2.00) 0.90 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)

OK Maximum 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Community boilers

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

# **Regulations Compliance Report**

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.9	
Maximum	1.5	OK
MVHR efficiency:	91%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	oĸ
Based on:		
Overshading:	Average or unknown	
Windows facing: North	10.64m²	
Ventilation rate:	4.00	
10 Key features		
Windows U-value	0.9 W/m²K	
Community heating, heat from boilers – mains gas		

Photovoltaic array

# **Thermal Bridge Report**

Property Details: Unit 3 - COPPETTS WOOD, London

Address:

Located in: England Region: Thames valley

Thermal bridges:

Thermal bridges: No information on thermal bridging (y=0.15) (y=0.15)

### **Predicted Energy Assessment**



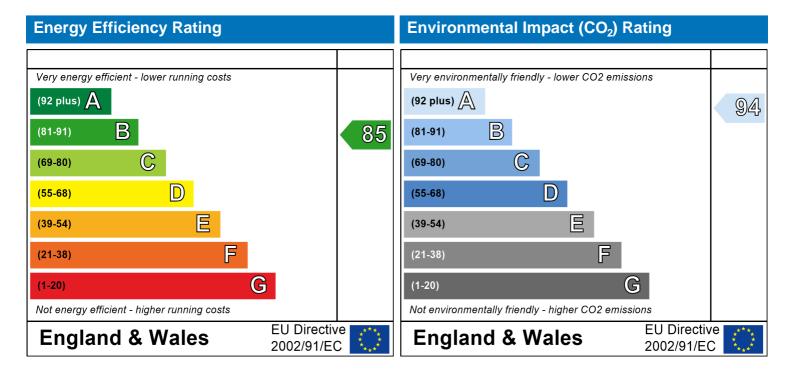
Dwelling type:
Date of assessment:
Produced by:

Mid floor Flat 30 September 2020 John Ashe

Total floor area: John Ash 57.39 m<sup>2</sup>

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.

### **Developer Confirmation Report**

### Property Details: Unit 3 - COPPETTS WOOD, London

Address:

Located in: England Region: Thames valley

UPRN:

Date of assessment: 30 September 2020 Date of certificate: 07 October 2020

Assessment type: New dwelling design stage

Transaction type: New dwelling

Thermal Mass Parameter: Indicative Value Low

Comments:

#### Property description:

Dwelling type: Flat

Detachment:

Year Completed: 2020 Front of dwelling faces: North

Comments:

### Opening types:

Name: Type: Frame Factor: g-value: U-Value: Area: Rear Windows Windows 0.7 0.63 0.9 10.64

Overshading: Average or unknown

Comments:

### Opaque Elements:

Type: U-Value: Kappa:

**External Elements** 

Walls 0.15 Please provide the U-Value calculation to justify the U-Value entered into the assessment. N/A

Internal Elements (Area, Kappa)
Party Elements (Area, Kappa)

#### Thermal bridges:

Thermal bridges: No information on thermal bridging (y=0.15) (y=0.15)

# **Developer Confirmation Report**

Comments:	
If specific construction details h	ave been adopted then please provide the associated checklists; signed and dated.
Ventilation:	
Pressure test: Ventilation:	Yes (As designed) Balanced with heat recovery Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True
Pressure test: Comments:	5
Please provide the pressure test	t certificate, or certificates if the result is based on an average; signed and dated.
Main heating system:	
Main heating system:	Community heating schemes Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, low temp, variable flow
Comments:	
Main heating Control:	
Main heating Control:  Comments:	Charging system linked to use of community heating, programmer and at least two room thermostats
Comments.	
Secondary heating system:	
Secondary heating system: Comments:	None

# **Developer Confirmation Report**

Water heating:	
Water heating: Comments:	No hot water cylinder
	Solar panel: False
Others:	
Electricity tariff: Low energy lights: Terrain type: Wind turbine: Photovoltaics:  Comments:	Standard Tariff 100% Low rise urban / suburban No Photovoltaic 1 Installed Peak power: 0.648 Tilt of collector: 30° Overshading: None or very little Collector Orientation: South
	tificate or data sheet equivalent confirming the size of the array on the roof. This should support a proportioned amount included in the assessment.
Declaration :	
I confirm that the property has Signed:	s been built to the above specification.
Date:	

User Details: **Assessor Name:** John Ashe Stroma Number: STRO031268 Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.8 Property Address: Unit 3 - COPPETTS WOOD, London Address: 1. Overall dwelling dimensions Area(m²) Av. Height(m) Volume(m³) Ground floor (1a) x (2a) = 152.66 (3a) 57.39 2.66 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)(4)57.39 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =152.66 (5) total main secondary other m³ per hour heating heating x 40 =Number of chimneys (6a) 0 0 x 20 =Number of open flues 0 O O 0 0 (6b) Number of intermittent fans x 10 =(7a) 0 0 x 10 =Number of passive vents (7b) 0 0 x 40 =Number of flueless gas fires (7c)Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = $\div$  (5) = (8) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9) O Additional infiltration (10)[(9)-1]x0.1 =0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)0 if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 (13)O Percentage of windows and doors draught stripped (14)0 Window infiltration  $0.25 - [0.2 \times (14) \div 100] =$ 0 (15)Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =O (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then  $(18) = [(17) \div 20] + (8)$ , otherwise (18) = (16)0.25 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0  $(20) = 1 - [0.075 \times (19)] =$ Shelter factor (20)1  $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor 0.25 (21)Infiltration rate modified for monthly wind speed Jan Feb Jul Sep Mar Apr Mav Jun Aug Oct Nov Dec Monthly average wind speed from Table 7 (22)m =5.1 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor  $(22a)m = (22)m \div 4$ (22a)m 1.27 1.25 1.23 1.08 0.95 0.95 0.92 1 1.08 1.12 1.1 1.18

Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.32	0.31	0.31	0.28	0.27	0.24	0.24	0.23	0.25	0.27	0.28	0.29	]	
Calculate effe		•	rate for t	he appli	cable ca	se			ı			0.5	(23a)
If exhaust air I			endix N, (2	(3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b	) = (23a)			0.5	(23b)
If balanced wi	th heat rec	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	) =				77.35	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = $(22b)m + (23b) \times [1 - (23b)m]$													` ′
(24a)m= 0.43													(24a)
b) If balanc	ed mech	anical ve	entilation	without	heat red	covery (N	ЛV) (24b	)m = (22	2b)m + (	23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole if (22b)	house ex m < 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)	l ventilati m = 1, th								0.5]	-	-		
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(24d)
Effective ai	r change	rate - er	nter (24a	) or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(25)
3. Heat loss	es and he	eat loss p	paramet	er:									
ELEMENT	Gros area	ss (m²)	Openin m	•	Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value kJ/m²-l		X k J/K
Windows					10.64	x1.	/[1/( 0.9 )+	0.04] =	9.24				(27)
Walls	25.8	33	10.6	4	15.19	) X	0.15	= [	2.28				(29)
Total area of	elements	s, m²			25.83	3							(31)
* for windows an ** include the are						ated using	formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	
Fabric heat lo		,	U)				(26)(30)	+ (32) =				11.52	(33)
Heat capacity		` '						((28)	(30) + (32	2) + (32a).	(32e) =	911.4	(34)
Thermal mass	•	,		,					tive Value			100	(35)
For design asses can be used inst				construct	ion are noi	t known pr	ecisely the	indicative	values of	IMP In Ta	able 1f		
Thermal bridg	ges : S (L	x Y) cal	culated (	using Ap	pendix l	<						3.87	(36)
if details of therm		are not kn	own (36) =	= 0.05 x (3	11)			(00)	(0.0)				
Total fabric h			ا ما اما محمد ا	_					(36) =	(OE) ·· (E)		15.4	(37)
Ventilation he	1	1		i	lun	11	Aug	· ,		(25)m x (5)	<u> </u>	1	
(38)m= 21.76	Feb 21.45	Mar 21.13	Apr 19.56	May 19.24	Jun 17.67	Jul 17.67	Aug 17.35	Sep 18.3	Oct 19.24	Nov 19.87	Dec 20.5		(38)
Heat transfer		<u> </u>			<u> </u>	<u> </u>			= (37) + (37)	<u> </u>		J	
(39)m= 37.16	36.84	36.53	34.96	34.64	33.07	33.07	32.75	33.7	34.64	35.27	35.9	]	
(11)	1									Sum(39) <sub>1</sub>		34.88	(39)
Heat loss par	ameter (I	HLP), W	/m²K	T			1	(40)m	= (39)m ÷	- (4)	1	1	
(40)m= 0.65	0.64	0.64	0.61	0.6	0.58	0.58	0.57	0.59	0.6	0.61	0.63		
Number of da	ys in mo	nth (Tab	le 1a)					,	Average =	Sum(40) <sub>1</sub>	12 /12=	0.61	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ing ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occupancy, N													(42)
Annual averag Reduce the annua not more that 125	al average	hot water	usage by	5% if the $a$	lwelling is	designed			se target o		.49		(43)
Jan Hot water usage ii	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
						1	· <i>'</i>	77.0	04.00	04.00	07.44	1	
(44)m= 87.44	84.26	81.08	77.9	74.72	71.54	71.54	74.72	77.9	81.08 Fotal = Sui	84.26	87.44	953.88	(44)
Energy content of	hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			. ,		953.66	J <sup>(44)</sup>
(45)m= 129.67	113.41	117.03	102.03	97.9	84.48	78.28	89.83	90.9	105.94	115.64	125.58		
If instantaneous w	ater heati	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		Γotal = Su	m(45) <sub>112</sub> =		1250.69	(45)
(46)m= 19.45	17.01	17.55	15.3	14.68	12.67	11.74	13.47	13.64	15.89	17.35	18.84		(46)
Water storage					/\/\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-1	20.2		1			· I	
Storage volum	` ,		•			•		ame ves	sei		0		(47)
If community hours of therwise if no	_			_			, ,	ore) onto	or 'O' in <i>(</i>	<b>47</b> )			
Water storage		not wate	ei (uiis ii	iciudes i	IIStaritai	ieous cc	ווטט וטווונ	ers) erite	ei U iii (4	47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature f					,	• ,					0		(49)
Energy lost fro		-	-				(48) x (49)	) =		1	10		(50)
<ul><li>b) If manufact</li><li>Hot water stora</li></ul>			-								02		(51)
If community h	-			IC 2 (KVV)	11/11110/00	·y <i>)</i>				0.	02		(31)
Volume factor	_									1.	03		(52)
Temperature f	actor fro	m Table	2b							0	.6		(53)
Energy lost fro	m watei	r storage	, kWh/ye	ear			(47) x (51)	) x (52) x (	53) =	1.	03		(54)
Enter (50) or (	(54) in (5	55)								1.	03		(55)
Water storage	loss cal	culated f	for each	month	_	_	((56)m = (	55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (	H11)] ÷ (5	0), else (5	7)m = (56)	m where (	H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	•	,									0		(58)
Primary circuit				,	•		, ,						
(modified by				1		i	<del></del>				00.00	1	(59)
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(39)
Combi loss ca			r	<del>` ´</del>	<del>`</del>	<del>- ` `</del>		_					(64)
(61)m= 0	0	0	0	0	0	0	(22)	0	0	0	0	( <b>-0</b> )	(61)
			<del></del>				<del>`                                    </del>		<del></del>		<u> </u>	(59)m + (61)m	(60)
(62)m= 184.95	163.34	172.31	155.52	153.18	137.97	133.56	145.11	144.4	161.22	169.13	180.86		(62)

Company   Comp
Output from water heater  (64)m= 184.95
Re4.ps
Cutput from water heater   Cutput from water h
Heat gains from water heating, kWh/morth 0.25 ' [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65)m   87.34   77.85   83.13   76.72   76.77   70.88   70.25   74.09   73.02   79.45   81.25   85.98   (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating    Solution   Include   Include
(65)me
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating    See   Table   See   Table
Metabolic gains (Table 5), Wats   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec   (66)m   114.42   1
Metabolic gains (Table 5), Watts    Jan
Sep
Sep
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5  (67)m= 37.69  33.48  27.22  20.61  15.41  13.01  14.05  18.27  24.52  31.13  36.34  38.74  (67)  Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5  (68)m= 248.24  250.81  244.32  230.5  213.06  196.66  185.71  183.14  189.63  203.45  220.89  237.29  (68)  Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5  (69)m= 48.35  48.3
(67)m=
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5  (68)m= 248.24   250.81   244.32   230.5   213.06   196.66   185.71   183.14   189.63   203.45   220.89   237.29   (68)  Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5  (69)m= 48.35   48.35
(68)m= 248.24
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5  (69)m= 48.35
Figure   148.35
Figure   148.35
Column
Column
Water heating gains (Table 5)  (72)m= 117.39
Water heating gains (Table 5)  (72)m= 117.39
(72)m=         117.39         115.55         111.74         106.55         103.19         98.45         94.42         99.58         101.42         106.78         112.84         115.56         (72)           Total internal gains =         (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m           (73)m=         489.8         486.33         469.77         444.16         418.14         394.61         380.68         387.48         402.05         427.85         456.56         478.07         (73)           6. Solar gains:           Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.           Orientation: Access Factor Table 6d         Area Mare Table 6a         Flux Table 6b         Table 6b         Table 6c         (W)           North         0.9x         0.77         x         10.64         x         10.63         x         0.63         x         0.7         =         34.58         (74)           North         0.9x         0.77         x         10.64         x         20.32         x         0.63         x         0.7         =         112.28         (74)           North         0.9x         0.77         x
(72)m=         117.39         115.55         111.74         106.55         103.19         98.45         94.42         99.58         101.42         106.78         112.84         115.56         (72)           Total internal gains =         (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m           (73)m=         489.8         486.33         469.77         444.16         418.14         394.61         380.68         387.48         402.05         427.85         456.56         478.07         (73)           6. Solar gains:           Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.           Orientation: Access Factor Table 6d         Area Mare Table 6a         Flux Table 6b         Table 6b         Table 6c         (W)           North         0.9x         0.77         x         10.64         x         10.63         x         0.63         x         0.7         =         34.58         (74)           North         0.9x         0.77         x         10.64         x         20.32         x         0.63         x         0.7         =         112.28         (74)           North         0.9x         0.77         x
(73)m=
6. Solar gains:         Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.         Orientation:       Access Factor Table 6d       Area m²       Flux Table 6a       Table 6b       FF Table 6c       Gains (W)         North       0.9x       0.77       x       10.64       x       10.63       x       0.63       x       0.7       =       34.58       (74)         North       0.9x       0.77       x       10.64       x       20.32       x       0.63       x       0.7       =       66.08       (74)         North       0.9x       0.77       x       10.64       x       34.53       x       0.63       x       0.7       =       112.28       (74)         North       0.9x       0.77       x       10.64       x       55.46       x       0.63       x       0.7       =       180.35       (74)         North       0.9x       0.77       x       10.64       x       74.72       x       0.63       x       0.7       =       242.95       (74)         North       0.9x       0.77       x       10.64       x       74.72       x
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.  Orientation: Access Factor Table 6d
Orientation:         Access Factor Table 6d         Area m²         Flux Table 6a         g_ Table 6b         FF Table 6c         Gains (W)           North         0.9x         0.77         x         10.64         x         10.63         x         0.63         x         0.7         =         34.58         (74)           North         0.9x         0.77         x         10.64         x         20.32         x         0.63         x         0.7         =         66.08         (74)           North         0.9x         0.77         x         10.64         x         34.53         x         0.63         x         0.7         =         112.28         (74)           North         0.9x         0.77         x         10.64         x         55.46         x         0.63         x         0.7         =         180.35         (74)           North         0.9x         0.77         x         10.64         x         74.72         x         0.63         x         0.7         =         242.95         (74)           North         0.9x         0.77         x         10.64         x         79.99         x         0.63         x         0.7<
Table 6d m <sup>2</sup> Table 6a Table 6b Table 6c (W)  North 0.9x 0.77 x 10.64 x 10.63 x 0.63 x 0.7 = 34.58 (74)  North 0.9x 0.77 x 10.64 x 20.32 x 0.63 x 0.7 = 66.08 (74)  North 0.9x 0.77 x 10.64 x 34.53 x 0.63 x 0.7 = 112.28 (74)  North 0.9x 0.77 x 10.64 x 55.46 x 0.63 x 0.7 = 180.35 (74)  North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7 = 242.95 (74)  North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09 (74)
North
North
North 0.9x 0.77 x 10.64 x 34.53 x 0.63 x 0.7 = 112.28 (74)  North 0.9x 0.77 x 10.64 x 55.46 x 0.63 x 0.7 = 180.35 (74)  North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7 = 242.95 (74)  North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09 (74)
North 0.9x 0.77 x 10.64 x 55.46 x 0.63 x 0.7 = 180.35 (74)  North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7 = 242.95 (74)  North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09 (74)
North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7 = 242.95 (74)  North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09 (74)
North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09 (74)
Ni-set
North 0.9x 0.77 x 10.64 x 74.68 x 0.63 x 0.7 = 242.83 (74)
North 0.9x 0.77 x 10.64 x 59.25 x 0.63 x 0.7 = 192.65 (74)
North 0.9x 0.77 x 10.64 x 41.52 x 0.63 x 0.7 = 135 (74)
North 0.9x 0.77 x 10.64 x 24.19 x 0.63 x 0.7 = 78.66 (74)

North	0.9x	0.77	x	10.	64	x	1	3.12	×	0.63	x	0.7	=	42.65	(74)
North	0.9x	0.77	X	10.	64	x	8	3.86	x	0.63	×	0.7	=	28.82	(74)
Solar	gains in	watts, ca	alculated	for eac	h month	1			(83)m =	Sum(74)m	(82)m			_	
(83)m=	34.58	66.08	112.28	180.35	242.95	26	60.09	242.83	192.6	5 135	78.66	42.65	28.82		(83)
Total g	ains – i	nternal a	and solar	(84)m =	= (73)m	+ (8	33)m	, watts		•	•	•	•	•	
(84)m=	524.38	552.41	582.06	624.51	661.1	6	54.7	623.5	580.13	3 537.05	506.51	499.21	506.9		(84)
7. Me	an inter	nal temp	perature	(heating	seasor	n)									
Temp	erature	during h	neating p	eriods ir	n the livi	ng	area f	from Tab	ole 9, 1	h1 (°C)				21	(85)
Utilisa	ation fac	tor for a	ains for	iving are	ea, h1,m	า (ร	ee Ta	ble 9a)							
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.86	0.82	0.76	0.62	0.47	(	0.32	0.23	0.26	0.43	0.65	0.79	0.86		(86)
Moon	intorno	l tompor	oturo in	living or	oo T1 /f	مالہ	w oto	no 2 to 7	l 7 in To	hla Oa)		!	<u> </u>	ı	
(87)m=	20.35	20.48	ature in	20.87	20.97	T	21	21	21	20.98	20.88	20.64	20.37	1	(87)
		<u> </u>			<u> </u>	<u> </u>		<u> </u>	<u> </u>	_	20.00	20.04	20.57	J	(01)
-			· · ·		ı	_		i	1	Th2 (°C)	1		1	1	(22)
(88)m=	20.39	20.39	20.4	20.42	20.43	2	0.45	20.45	20.46	20.44	20.43	20.42	20.41		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,	m (se	e Table	9a)						
(89)m=	0.84	0.81	0.74	0.6	0.45	(	0.29	0.2	0.23	0.39	0.62	0.78	0.85		(89)
Mean	interna	l temper	ature in	the rest	of dwell	ina	T2 (fc	ollow ste	ens 3 to	7 in Tab	le 9c)	-		•	
(90)m=	19.53	19.7	19.97	20.27	20.39	Ť	0.45	20.45	20.46		20.28	19.95	19.56	]	(90)
, ,		ļ	<u> </u>		!			<u> </u>			L fLA = Livir	ng area ÷ (4	4) =	0.51	(91)
						II.	- \ (1		. /4	(I A) TO					`
		<del></del>	· `		1	_		i	<del>_</del>	$\frac{\text{fLA}) \times \text{T2}}{\text{L}_{22.74}}$	1	1 00 0	10.07	1	(02)
(92)m=	19.95	20.1	20.32	20.58	20.68	1	0.73	20.73	20.73		20.59	20.3	19.97		(92)
		1	1		· ·	_		1		here appr	r <del>i</del>	1 00 0	40.07	1	(02)
(93)m=	19.95	20.1	20.32	20.58	20.68	1 2	0.73	20.73	20.73	20.71	20.59	20.3	19.97		(93)
			uirement					44 6	<b>-</b>	01 41		70)		1 4	
			ternal ter or gains			ned	at ste	ep 11 of	lable	9b, so tha	at II,m=(	76)m an	d re-cal	culate	
tilo di	Jan	Feb	Mar	Apr	May	Т	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Utilisa		l	ains, hm		Iviay		oan	<u> </u>	7105	,	1 000	1 1101	1 200	J	
(94)m=	0.83	0.8	0.74	0.61	0.46		0.31	0.22	0.24	0.41	0.63	0.77	0.84	]	(94)
		hmGm	, W = (94					<u> </u>	<u> </u>		<u>!</u>		<u> </u>	J	
(95)m=	436.86	442.26	428.5	379.44	303.29	20	01.57	136.39	141.6	1 219.33	318.74	385.28	425.81	]	(95)
Montl	hly aver	age exte	ernal tem	perature	from T	abl	e 8			<u>!</u>		!	ļ	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 rate	e for me	an intern	al tempe	erature,	Lm	, W =	-[(39)m :	x [(93)	m– (96)m	1		ļ	ı	
(97)m=	581.43	559.93	504.88	408.17	311.13	_	02.57	136.57	141.8	<del></del>	345.93	465.69	566.24	]	(97)
Snac	e heatin	g require	ement fo	r each n	nonth, k	Wh	/mont	th = 0.02	24 x [(9	7)m – (95	5)m] x (4	1)m	I	ı	
Opac		<del></del>				1		ī	<u> </u>	<del>-                                    </del>	<del>, • `</del>	r ·		1	
(98)m=	107.55	79.07	56.83	20.69	5.84	1	0	0	0	0	20.23	57.89	104.48		
•	107.55	79.07	56.83	20.69	5.84		0	0	<u> </u>	0 otal per year	<u> </u>	<u> </u>		452.58	(98)
(98)m=		<u> </u>	56.83		<u> </u>	<u> </u>	0	0	<u> </u>		<u> </u>	<u> </u>		452.58 7.89	(98)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

		44) [6] [7		7,
Fraction of space heat from secondary/supplemen		11) '0' if none	0	(301)
Fraction of space heat from community system 1 -		1	(302)	
The community scheme may obtain heat from several sources includes boilers, heat pumps, geothermal and waste heat from			the latter	
Fraction of heat from Community boilers			0.4	(303a)
Fraction of community heat from heat source 2			0.4	(303b)
Fraction of total space heat from Community boile	rs	(302) x (303a) =	0.4	(304a)
Fraction of total space heat from community heat	source 2	(302) x (303b) =	0.4	(304b)
Factor for control and charging method (Table 4c(	3)) for community he	eating system	1	(305)
Distribution loss factor (Table 12c) for community	heating system		1.05	(306)
Space heating			kWh/year	_
Annual space heating requirement			452.58	
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	190.08	(307a)
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	190.08	(307b)
Efficiency of secondary/supplementary heating sys	stem in % (from Tab	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/supple	ementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating				_
Annual water heating requirement			1901.53	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x (305) x (306) =	798.64	(310a)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	798.64	(310b)
Electricity used for heat distribution	0.0	01 × [(307a)(307e) + (310a)(310e)] =	19.77	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if	not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Tab mechanical ventilation - balanced, extract or positi		e	209.52	
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	209.52	] (331)
Energy for lighting (calculated in Appendix L)		(*****) (******)	266.24	(332)
Electricity generated by PVs (Appendix M) (negati	ve quantity)		-559.63	(333)
Electricity generated by wind turbine (Appendix M)			0	(334)
10b. Fuel costs – Community heating scheme	, (nogative quantity)			
105. Tuel costs Community heating scheme				
	<b>Fuel</b> kWh/year	<b>Fuel Price</b> (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.01 =	8.06	(340a)

(307b) x

Space heating from heat source 2

(340b)

x 0.01 =

Water heating from CHP	(310a) x		4.24 × 0.01 =	33.86	(342a)
Water heating from heat source 2	(310b) x		4.24 × 0.01 =	33.86	(342b)
		Fue	el Price		_
Pumps and fans	(331)		13.19 x 0.01 =	27.64	(349)
Energy for lighting	(332)		13.19 x 0.01 =	35.12	(350)
Additional standing charges (Table 12	)			120	(351)
Energy saving/generation technologie	S				_
Total energy cost	= (340a)(342e) + (345)(354	<b>1)</b> =		266.6	(355)
11b. SAP rating - Community heating	scheme				
Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$			1.09	(357)
SAP rating (section12)				84.74	(358)
12b. CO2 Emissions – Community he	ating scheme	Engrave	Emission factor	Emissians	
		Energy kWh/year	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and					_
Efficiency of heat source 1 (%)	If there is CHP using tw	vo fuels repeat (363) to	(366) for the second fu	el 89	(367a)
Efficiency of heat source 2 (%)	If there is CHP using tw	vo fuels repeat (363) to	(366) for the second fu	el 89	(367b)
CO2 associated with heat source 1	[(307b)+(31	0b)] x 100 ÷ (367b) x	0.22	239.96	(367)
CO2 associated with heat source 2	[(307b)+(31	0b)] x 100 ÷ (367b) x	0.22	239.96	(368)
Electrical energy for heat distribution	[(31	13) x	0.52	10.26	(372)
Total CO2 associated with community	systems (36	3)(366) + (368)(37	2)	490.18	(373)
CO2 associated with space heating (s	econdary) (30	9) x	0	= 0	(374)
CO2 associated with water from imme	rsion heater or instantaneou	ıs heater (312) x	0.22	0	(375)
Total CO2 associated with space and	water heating (37	3) + (374) + (375) =		490.18	(376)
CO2 associated with electricity for pur	nps and fans within dwelling	(331)) x	0.52	108.74	(378)
CO2 associated with electricity for ligh	ting (33	2))) x	0.52	138.18	(379)
Energy saving/generation technologie Item 1	s (333) to (334) as applicabl	e	0.52 x 0.01 =	000.45	(380)
	sum of (376)(382) =	<u></u>	0.52 X 0.01 =	-290.45	
Total CO2, kg/year  Dwelling CO2 Emission Rate	(383) ÷ (4) =			7.78	(383)
El rating (section 14)				94.15	(385)
13b. Primary Energy – Community he	ating scheme			34.13	
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Energy from other sources of space a Efficiency of heat source 1 (%)		vo fuels repeat (363) to	(366) for the second fu	el 89	(367a)
Efficiency of heat source 2 (%)	If there is CHP using tv	vo fuels repeat (363) to	(366) for the second fu		(367b)
_ (,0,	· ·				

Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	] = [	1355.33	(367)
Energy associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	1 = [	1355.33	] (368)
Zilongy according man near course Z	[(0075)1(0105)] x 100 : (0075) x	1.22	l L	1333.33	_(000)
Electrical energy for heat distribution	[(313) x		= [	60.71	(372)
Total Energy associated with community systems	(363)(366) + (368)(372	)	= [	2771.38	(373)
if it is negative set (373) to zero (unless specified oth	erwise, see C7 in Appendix C	)	[	2771.38	(373)
Energy associated with space heating (secondary)	(309) x	0	= [	0	(374)
Energy associated with water from immersion heater or	r instantaneous heater(312) x	1.22	= [	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =		[	2771.38	(376)
Energy associated with space cooling	(315) x	3.07	= [	0	(377)
Energy associated with electricity for pumps and fans w	vithin dwelling (331)) x	3.07	= [	643.23	(378)
Energy associated with electricity for lighting	(332))) x	3.07	= [	817.37	(379)
Energy saving/generation technologies Item 1		3.07 × 0.0	01 =	-1718.05	(380)
Total Primary Energy, kWh/year sun	n of (376)(382) =			2513.93	(383)

User Details: John Ashe **Assessor Name:** Stroma Number: STRO031268 Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.8 Property Address: Unit 3 - COPPETTS WOOD, London Address: 1. Overall dwelling dimensions Area(m²) Av. Height(m) Volume(m³) Ground floor (1a) x (2a) = (3a) 57.39 2.66 152.66 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)(4)57.39 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =152.66 (5) total main secondary other m³ per hour heating heating x 40 =Number of chimneys (6a) 0 0 x 20 =Number of open flues 0 O O 0 0 (6b) Number of intermittent fans x 10 =(7a) 2 20 x 10 =Number of passive vents (7b) 0 0 x 40 =Number of flueless gas fires (7c)Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = $\div$  (5) = (8) 0.13 If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9) O Additional infiltration (10)[(9)-1]x0.1 =0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)0 if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 (13)O Percentage of windows and doors draught stripped (14)0 Window infiltration  $0.25 - [0.2 \times (14) \div 100] =$ 0 (15)Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =O (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then  $(18) = [(17) \div 20] + (8)$ , otherwise (18) = (16)0.38 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0  $(20) = 1 - [0.075 \times (19)] =$ Shelter factor (20)1  $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.38 Infiltration rate modified for monthly wind speed Jan Feb Jul Sep Mar Apr Mav Jun Aug Oct Nov Dec Monthly average wind speed from Table 7 (22)m =5.1 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor  $(22a)m = (22)m \div 4$ (22a)m 1.27 1.25 1.23 1.08 0.95 0.95 0.92 1 1.08 1.12 1.1 1.18

Adjusted infiltration	rate (allow	ina for sl	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.49 0.44	<del>`</del>	0.42	0.41	0.36	0.36	0.35	0.38	0.41	0.43	0.45		
Calculate effective	ir change	rate for t	he appli	cable ca	se			<u> </u>			<u> </u>	
If mechanical ver											0	(23a)
If exhaust air heat pur			, ,	,	. `	,, .	,	) = (23a)			0	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c)												(0.4.)
(24a)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced me		1				<del>,                                    </del>	, `	<del> </del>	<del></del>	1	1	4
(24b)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house if (22b)m < 0.			•	•				.5 × (23b	o)			
(24c)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventil if (22b)m = 1,				•				0.51	•	•		
(24d)m= 0.62 0.6	<u> </u>	0.59	0.58	0.57	0.57	0.56	0.57	0.58	0.59	0.6		(24d)
Effective air chan	ge rate - e	nter (24a	ı) or (24k	o) or (24	c) or (24	d) in box	(25)	<u> </u>	!	!	l	
(25)m= 0.62 0.6	<u> </u>	0.59	0.58	0.57	0.57	0.56	0.57	0.58	0.59	0.6		(25)
2 Haatlaaaa a	h a a t la a a											
3. Heat losses and	ross	•		Net Ar	00	U-valı	10	AXU		k-value	`	ΑΧk
	ea (m²)	Openir m		A,r		W/m2		(W/I		kJ/m²-l		kJ/K
Windows				10.64	x1.	/[1/( 1.4 )+	0.04] =	14.11				(27)
Walls :	5.83	10.6	4	15.19	X	0.18	= [	2.73				(29)
Total area of eleme	nts, m²			25.83	3							(31)
* for windows and roof w ** include the areas on b					ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
Fabric heat loss, W	K = S (A x	: U)				(26)(30)	+ (32) =				16.84	(33)
Heat capacity Cm =	S(A x k)						((28)	(30) + (32	2) + (32a).	(32e) =	911.4	(34)
Thermal mass para	neter (TM	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assessments can be used instead of a			construct	ion are not	t known pr	recisely the	indicative	values of	TMP in Ta	able 1f		
Thermal bridges : S	(L x Y) ca	lculated	using Ap	pendix ł	<						1.29	(36)
if details of thermal bridg	•	nown (36) :	= 0.05 x (3	1)								
Total fabric heat los								(36) =			18.13	(37)
Ventilation heat loss	1	d monthl	y 1					= 0.33 × (	(25)m x (5)	) <del> </del>	1	
Jan Fe		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m= 31.13 30.9	30.68	29.61	29.41	28.49	28.49	28.32	28.85	29.41	29.82	30.24		(38)
Heat transfer coeffic	ient, W/K	,	,			,	(39)m	= (37) + (	38)m	,	1	
(39)m= 49.26 49.0	3 48.81	47.74	47.55	46.62	46.62	46.45	46.98	47.55	47.95	48.37		
Heat loss paramete	· (HLP), W	//m²K						Average = = (39)m ÷		12 /12=	47.74	(39)
(40)m= 0.86 0.89	0.85	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.84	0.84		
Number of days in r	nonth (Tab	ole 1a)						Average =	Sum(40) <sub>1</sub>	12 /12=	0.83	(40)
Jan Fe	b Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
<u> </u>												1	
4. Water hea	iting ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1												(42)	
Annual average Reduce the annual	Annual average hot water usage in litres per day Vd,average = (25 x N) + 36  Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres pe	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)	•	•	•		•	
(44)m= 87.44	84.26	81.08	77.9	74.72	71.54	71.54	74.72	77.9	81.08	84.26	87.44		٦
Energy content of	f hot water	used - cal	culated m	onthly $= 4$ .	190 x Vd,r	m x nm x E	OTm / 3600		Total = Su oth (see Ta	. ,		953.88	(44)
(45)m= 129.67	113.41	117.03	102.03	97.9	84.48	78.28	89.83	90.9	105.94	115.64	125.58		
If instantaneous	vater heati	ing at point	of use (no	o hot wate	r storage).	enter 0 in	boxes (46		Total = Su	m(45) <sub>112</sub> =	=	1250.69	(45)
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water storage			I								l .	] <b>1</b>	
Storage volun	•	,	•			_		ame ves	sel		150		(47)
If community Otherwise if n	_			_			` '	ers) ente	er '0' in <i>(</i>	47)			
Water storage			(					, , , , , , , , ,		,			
a) If manufac	turer's d	eclared I	oss fact	or is kno	wn (kWl	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost from b) If manufact		•			or is not	known:	(48) x (49	) =			0		(50)
Hot water sto			-								0		(51)
If community	•		on 4.3									1	
Volume factor Temperature			2h								0		(52)
•				005			(47) v (E4	) v (E2) v (	E2) _		0		(53)
Energy lost from Enter (50) or		_	;, KVVII/y	Eal			(41) X (31	) x (52) x (	JJ) =	-	0		(54) (55)
Water storage	` , ` `	,	for each	month			((56)m = (	(55) × (41)	m				()
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (	(H11)] ÷ (5	0), else (5	7)m = (56)	m where (	H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary circui						. ,	, ,						
(modified b	1					1	<del></del>		ı —		ı	I	<i>(</i> )
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41	)m	1	ı	ı		1	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
	1		<del></del>				<del>`</del>		<del>`                                    </del>	<del>` ´                                     </del>	<del>`</del>	(59)m + (61)m	
(62)m= 110.22	96.4	99.47	86.72	83.21	71.81	66.54	76.36	77.27	90.05	98.29	106.74		(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)  (add additional lines if FGHRS and/or WWHRS applies, see Appendix G)													
(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= 110.22 96.4 99.47 86.72 83.21 71.81 66.54 76.36 77.27 90.05 98.29 10	06.74												
Output from water heater (annual) 112	1063.09 (64)												
Heat gains from water heating, kWh/month 0.25 $'$ [0.85 $\times$ (45)m + (61)m] + 0.8 $\times$ [(46)m + (57)m + (61)m]	(59)m ]												
(65)m= 27.55 24.1 24.87 21.68 20.8 17.95 16.64 19.09 19.32 22.51 24.57 2	26.69 (65)												
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from commu	unity heating												
5. Internal gains (see Table 5 and 5a):													
Metabolic gains (Table 5), Watts													
JanFebMarAprMayJunJulAugSepOctNov	Dec												
(66)m= 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35	95.35 (66)												
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m= 15.08 13.39 10.89 8.24 6.16 5.2 5.62 7.31 9.81 12.45 14.53 1	15.49 (67)												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m= 166.32 168.05 163.7 154.44 142.75 131.77 124.43 122.7 127.05 136.31 148 15	58.98 (68)												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m= 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53	32.53 (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)													
(71)m= -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28	76.28 (71)												
Water heating gains (Table 5)													
(72)m= 37.04 35.86 33.43 30.11 27.96 24.93 22.36 25.66 26.83 30.26 34.13 3	35.87 (72)												
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$													
(73)m= 270.04 268.9 259.62 244.4 228.48 213.51 204.01 207.27 215.29 230.62 248.27 2	61.95 (73)												
6. Solar gains:													
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.													
Orientation: Access Factor Area Flux g_ FF	Gains												
Table 6d m <sup>2</sup> Table 6a Table 6b Table 6c	(W)												
North 0.9x 0.77 x 10.64 x 10.63 x 0.63 x 0.7	= 34.58 (74)												
North 0.9x 0.77 x 10.64 x 20.32 x 0.63 x 0.7	= 66.08 (74)												
North 0.9x 0.77 x 10.64 x 34.53 x 0.63 x 0.7	= 112.28 (74)												
North 0.9x 0.77 x 10.64 x 55.46 x 0.63 x 0.7	= 180.35 (74)												
North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7	= 242.95 (74)												
North 0.9x 0.77 × 10.64 × 79.99 × 0.63 × 0.7	= 260.09 (74)												
North 0.9x 0.77 × 10.64 × 74.68 × 0.63 × 0.7	= 242.83 (74)												
North 0.9x 0.77 × 10.64 × 59.25 × 0.63 × 0.7	= 192.65 (74)												
North 0.9x 0.77 x 10.64 x 41.52 x 0.63 x 0.7	= 135 (74)												
	133 (14)												

North	0.9x	0.77	x	10.	64	x	1	3.12	x		0.63		x [	0.7	=	: .	42.65	(74)
North	0.9x	0.77	х	10.	64	X		8.86	x		0.63	<b>=</b>	х 🗏	0.7	╗.		28.82	(74)
	_												_			<u> </u>		_
Solar	ains in	watts, ca	alculated	for eac	h month	1			(83)m	= St	um(74)m .	(82	)m					
(83)m=	<b></b>	66.08	112.28	180.35	242.95	$\overline{}$	60.09	242.83	192	.65	135	78	.66	42.65	28.82	7		(83)
Total g	gains – i	nternal a	and solar	(84)m =	= (73)m	+ (	83)m	, watts							!	_		
(84)m=	304.61	334.98	371.9	424.75	471.43	4	473.6	446.84	399	.92	350.29	309	9.28	290.92	290.77	7		(84)
7. Me	an inter	nal temp	perature	(heating	seasor	า)												
Temp	erature	during h	neating p	eriods ir	n the liv	ing	area	from Tab	ole 9,	Th	1 (°C)						21	(85)
Utilisa	ation fac	tor for a	ains for I	iving are	ea, h1,n	n (s	ee Ta	ıble 9a)										_
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Aı	ug	Sep	С	Oct	Nov	Dec	:		
(86)m=	1	1	0.99	0.96	0.84	T	0.62	0.46	0.5	3	0.83	0.9	98	1	1	7		(86)
Mean	interna	l tampar	ature in	livina ar	22 T1 /f	ار	w sta	ne 3 to 7	in T	able	a 0c)							
(87)m=	20.1	20.21	20.41	20.71	20.92	$\overline{}$	20.99	21	2	$\neg$	20.94	20	.67	20.35	20.1	7		(87)
		<u> </u>			<u> </u>			<u> </u>	<u> </u>	!						_		,
			neating p		1	_		i			<u> </u>	- 00	00	00.00	00.00	7		(00)
(88)m=	20.2	20.21	20.21	20.23	20.23	<u> </u>	20.24	20.24	20.2	25	20.24	20.	.23	20.22	20.22			(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2	,m (se	e Table	9a)							_		
(89)m=	1	1	0.99	0.95	0.79		0.55	0.38	0.4	5	0.77	0.9	97	1	1			(89)
Mean	interna	l temper	ature in	the rest	of dwel	ling	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c	<b>c</b> )					
(90)m=	19.37	19.49	19.69	19.99	20.18	7	20.24	20.24	20.2	24	20.21	19	.96	19.63	19.38			(90)
			•			•					f	LA =	Livin	g area ÷ (4	4) =		0.51	(91)
Mean	interna	l temner	ature (fo	r the wh	ole dwa	llinد	na) – f	ΙΔ <b>ν</b> Τ1	<b>±</b> (1 .	_ fl	Δ) <b>v</b> T2							_
(92)m=	19.75	19.86	20.06	20.35	20.55	_	20.62	20.63	20.0		20.58	20	.32	20	19.74	٦		(92)
` '		<u> </u>	he mean			1		l										,
(93)m=	19.75	19.86	20.06	20.35	20.55	$\overline{}$	20.62	20.63	20.0		20.58	· ·	.32	20	19.74	7		(93)
		<u> </u>	uirement			_				_								
			ternal ter		re obtai	nec	at st	ep 11 of	Tabl	e 9b	o, so tha	t Ti.	m=(	76)m an	d re-ca	lculate		
			or gains									,	`			_		
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	O	Oct	Nov	Dec	;		
Utilisa	ation fac	tor for g	ains, hm	:												_		
(94)m=	1	1	0.99	0.95	0.81		0.59	0.42	0.4	.9	0.8	0.9	98	1	1			(94)
Usefu	ıl gains,	hmGm	W = (94)	1)m x (8	4)m	_										_		
(95)m=	304.09	333.79	367.87	403.56	383.89	2	77.24	187.45	195.	.55	280.68	301	1.66	289.81	290.4			(95)
Month	hly aver	age exte	rnal tem	perature	from T	ab	le 8									_		
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.		14.1		).6	7.1	4.2			(96)
			an intern			$\overline{}$		<del>-``</del>	<del></del>	<del>_</del>	· ,	i —				_		
(97)m=	760.95	733.36	661.74	546.79	420.97		80.75	187.78	196		304.5		2.12	618.39	751.79	)		(97)
-		<del></del>	ement fo		1	Wh		I				Ė		·	ı	_		
(98)m=	339.91	268.51	218.64	103.13	27.59		0	0	0		0		9.38	236.58	343.27	+		٦.
										Total	per year	(kWh	/year	) = Sum(9	8)15,912	=1	657.01	(98)
Space	e heatin	g require	ement in	kWh/m²	<sup>2</sup> /year											:	28.87	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	i				i			1		i			l	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	Lm (ca	lculated	using 25	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	438.23	344.99	353.01	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm				•					•	'	
(101)m=	0	0	0	0	0	0.97	0.99	0.98	0	0	0	0		(101)
Usefu	ıl loss, h	mLm (V	/atts) = (	100)m x	(101)m		•	•		•		•		
(102)m=	0	0	0	0	0	425.25	341.08	345.62	0	0	0	0		(102)
Gains	s (solar g	ains cal	culated	for appli	cable we	eather re	egion, se	e Table	10)			•	l.	
(103)m=	0	0	0	0	0	625.09	592.44	538.73	0	0	0	0		(103)
Spac	e cooling	g require	ement fo	r month,	whole a	lwelling,	continu	ous ( kW	h' = 0.02	24 x [(10	03)m – (	102)m ] :	k (41)m	
set (1	04)m to	zero if (	104)m <	3 × (98	)m									
(104)m=	0	0	0	0	0	143.88	187.01	143.67	0	0	0	0		
	-		-		-	-		-	Total	= Sum(	104)	=	474.56	(104)
Cooled	d fraction	1							f C =	cooled	area ÷ (4	4) =	1	(105)
Interm	ittency fa	actor (Ta	able 10b	)										_
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
							-		Total	l = Sum(	104)	=	0	(106)
Space	cooling	requirer	nent for	month =	(104)m	× (105)	× (106)r	n		_				
(107)m=	0	0	0	0	0	35.97	46.75	35.92	0	0	0	0		
					-		-	-	Total	= Sum(	107)	=	118.64	(107)
Space	cooling	requirer	nent in k	:Wh/m²/y	/ear				(107)	÷ (4) =			2.07	(108)
8f. Fab	ric Ener	gy Effici	ency (ca	lculated	l only un	der spec	cial cond	litions, se	ee sectio	on 11)				
Fabri	c Energy	/ Efficier	псу						(99) -	+ (108) =	=		30.94	(109)

			llser F	Details:						
Assessor Name:	John Ashe		OSCI L	Strom	o Num	bori		STDO	031268	
Software Name:	Stroma FSAP	2012		Softwa					on: 1.0.5.8	
			roperty	Address			TTS W			
Address :										
1. Overall dwelling dime	ensions:									
				a(m²)		Av. He	ight(m)	7	Volume(m³)	_
Ground floor				57.39	(1a) x	2	.66	(2a) =	152.66	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d	)+(1e)+(1r	n) [	57.39	(4)					
Dwelling volume					(3a)+(3b)	)+(3c)+(3d	l)+(3e)+	.(3n) =	152.66	(5)
2. Ventilation rate:										
	main heating	secondar heating	у	other		total			m³ per hou	r
Number of chimneys	0	+ 0	7 + [	0	] = [	0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	Ī + Ē	0	j = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans				,	2	x .	10 =	20	
Number of passive vents	3				_ 	0	x	10 =	0	(7b)
Number of flueless gas f					L		x 4	40 =		Ⅎ
Number of flueless gas i	1163				L	0	^	10 –	0	(7c)
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fans	s = (6a) + (6b) + (7a)	′a)+(7b)+(	(7c) =	Г	20		÷ (5) =	0.13	(8)
If a pressurisation test has l	•				continue fr			( )	00	` ′
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0  if both types of wall are p					•	uction			0	(11)
deducting areas of openi	·	, ,	ine grea	ier waii are	a (aner					
If suspended wooden	floor, enter 0.2 (ui	nsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	iter 0.05, else ente	er 0							0	(13)
Percentage of window	s and doors drau	ght stripped							0	(14)
Window infiltration				0.25 - [0.2	, ,	-	. (45)		0	(15)
Infiltration rate	arron avaraged :					12) + (13) -			0	(16)
Air permeability value, If based on air permeabi			•	•	•	etre or e	nvelope	area	5	(17)
Air permeability value applie	-					is being u	sed		0.38	(18)
Number of sides sheltered					•	ŭ			0	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			1	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18	) x (20) =				0.38	(21)
Infiltration rate modified	<del></del>	·		1					1	
Jan Feb	Mar Apr I	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1						1	1	
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25	<del></del>	.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m														
0.49														
Calculate effective air change rate for the applicable case		1												
If mechanical ventilation:	0	(23a)												
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0	(23b)												
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) $(24a)m = (22b)m + (23b) \times [1 - (23c) \div 100]$	ני	(24a)												
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)		(214)												
		(24b)												
c) If whole house extract ventilation or positive input ventilation from outside		(=)												
if $(22b)$ m $< 0.5 \times (23b)$ , then $(24c) = (23b)$ ; otherwise $(24c) = (22b)$ m $+ 0.5 \times (23b)$														
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
d) If natural ventilation or whole house positive input ventilation from loft														
if $(22b)m = 1$ , then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$														
(24d)m= 0.62 0.61 0.61 0.59 0.58 0.57 0.57 0.56 0.57 0.58 0.59 0.6														
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)														
(25)m= 0.62 0.61 0.61 0.59 0.58 0.57 0.57 0.56 0.57 0.58 0.59 0.6		(25)												
3. Heat losses and heat loss parameter:														
ELEMENT Gross Openings Net Area U-value A X U k-value	АХ	k												
area (m²) m² A ,m² W/m2K (W/K) kJ/m²-K	kJ/K													
Windows $10.64$ $x^{1/[1/(0.9)+0.04]} = 9.24$		(27)												
Walls 25.83 10.64 15.19 x 0.15 = 2.28		(29)												
Total area of elements, m <sup>2</sup> 25.83		(31)												
* 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														
. (26) (20) (22)	11.52	_												
	911.4	(33)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Low		(33)												
	100	(33) (34) (35)												
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f	100	(34)												
can be used instead of a detailed calculation.	100	(34)												
can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K	3.87	(34)												
can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K  if details of thermal bridging are not known (36) = 0.05 x (31)	3.87	(34) (35) (36)												
can be used instead of a detailed calculation.  Thermal bridges: $S(L \times Y)$ calculated using Appendix K  if details of thermal bridging are not known (36) = 0.05 x (31)  Total fabric heat loss  (33) + (36) =		(34)												
can be used instead of a detailed calculation.  Thermal bridges: $S(L \times Y)$ calculated using Appendix K  if details of thermal bridging are not known (36) = 0.05 x (31)  Total fabric heat loss  (33) + (36) =  Ventilation heat loss calculated monthly  (38)m = 0.33 x (25)m x (5)	3.87	(34) (35) (36)												
can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K  if details of thermal bridging are not known (36) = 0.05 x (31)  Total fabric heat loss  (33) + (36) =  Ventilation heat loss calculated monthly  (38)m = 0.33 x (25)m x (5)  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	3.87	(34) (35) (36)												
Can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K  if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss  (33) + (36) =  Ventilation heat loss calculated monthly  (38)m = $0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24	3.87	](34) ](35) ](36) ](37)												
Can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K  if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss  (33) + (36) =  Ventilation heat loss calculated monthly  (38)m = $0.33 \times (25)$ m × (5)  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24  Heat transfer coefficient, W/K  (39)m = (37) + (38)m	3.87	](34) ](35) ](36) ](37)												
can be used instead of a detailed calculation.         Thermal bridges: S (L x Y) calculated using Appendix K         if details of thermal bridging are not known (36) = 0.05 x (31)         Total fabric heat loss         Ventilation heat loss calculated monthly         Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec         (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24         Heat transfer coefficient, W/K         (39)m = (37) + (38)m         (39)m = (37) + (38)m	3.87 15.4	](34) ](35) ](36) ](37)												
can be used instead of a detailed calculation.         Thermal bridges: S (L x Y) calculated using Appendix K         if details of thermal bridging are not known (36) = 0.05 x (31)         Total fabric heat loss         Ventilation heat loss calculated monthly         Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec         (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24         Heat transfer coefficient, W/K         (39)m = (37) + (38)m         (39)m = (37) + (38)m	3.87	](34) ](35) ](36) ](37)												
can be used instead of a detailed calculation.         Thermal bridges: S (L x Y) calculated using Appendix K         if details of thermal bridging are not known (36) = 0.05 x (31)         Total fabric heat loss       (33) + (36) =         Ventilation heat loss calculated monthly       (38)m = 0.33 x (25)m x (5)         Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec         (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24         Heat transfer coefficient, W/K       (39)m = (37) + (38)m         (39)m= 46.53 46.3 46.3 46.07 45.01 44.81 43.88 43.88 43.71 44.24 44.81 45.21 45.63         Average = Sum(39) <sub>112</sub> /12=	3.87 15.4	](34) ](35) ](36) ](37)												
can be used instead of a detailed calculation.  Thermal bridges: S (L x Y) calculated using Appendix K  if details of thermal bridging are not known (36) = 0.05 x (31)  Total fabric heat loss  Ventilation heat loss calculated monthly  (38)m = 0.33 x (25)m x (5)  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24  Heat transfer coefficient, W/K  (39)m = (37) + (38)m  (39)m = (40.53 46.3 46.07 45.01 44.81 43.88 43.88 43.71 44.24 44.81 45.21 45.63 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.74 40.75 40.	3.87 15.4	](34) ](35) ](36) ](37)												
can be used instead of a detailed calculation.         Thermal bridges : S (L x Y) calculated using Appendix K         if details of thermal bridging are not known (36) = 0.05 x (31)         Total fabric heat loss       (33) + (36) =         Ventilation heat loss calculated monthly       (38)m = 0.33 x (25)m x (5)         Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec         (38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28.32 28.85 29.41 29.82 30.24         Heat transfer coefficient, W/K       (39)m = (37) + (38)m         (39)m= 46.53 46.3 46.07 45.01 44.81 43.88 43.88 43.71 44.24 44.81 45.21 45.63         Average = Sum(39)₁₂ /12=         Heat loss parameter (HLP), W/m²K       (40)m = (39)m ÷ (4)         (40)m= 0.81 0.81 0.81 0.8 0.78 0.78 0.78 0.76 0.76 0.76 0.77 0.78 0.79 0.8	3.87 15.4 45.01	(34) (35) (36) (37) (38)												

(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)		
4. Water hea	iting ene	rgy requi	irement:								kWh/ye	ear:			
Assumed occ if TFA > 13. if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (¯	ΓFA -13.		91		(42)		
Annual average Reduce the annual not more that 125	ge hot wa al average	hot water	usage by	5% if the $c$	lwelling is	designed			se target o		.49		(43)		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Hot water usage	in litres pe	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)								
(44)m= 87.44															
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)															
(45)m= 129.67	(45)m= 129.67 113.41 117.03 102.03 97.9 84.48 78.28 89.83 90.9 105.94 115.64 125.58														
(45)m=       129.67       113.41       117.03       102.03       97.9       84.48       78.28       89.83       90.9       105.94       115.64       125.58         Total = Sum(45) <sub>112</sub> =         If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)															
(46)m= 0	If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)														
Water storage		ا نمانیان			/\//\IDC							l	( )		
Storage volun	•		•			_		ame ves	sei		0		(47)		
Otherwise if n	_			_			, ,	ers) ente	er '0' in (	47)					
Water storage			•					,	`						
a) If manufac	turer's d	eclared I	oss fact	or is kno	wn (kWł	n/day):					0		(48)		
Temperature											0		(49)		
Energy lost from b) If manufact		•			or is not		(48) x (49	) =			0		(50)		
Hot water sto			-								0		(51)		
If community	•		on 4.3									1			
Volume factor Temperature			2h								0		(52)		
•							/4 <b>7</b> ) v / <b>5</b> 4	) v (EQ) v (I	E0)		0	] <b>!</b>	(53)		
Energy lost from Enter (50) or		•	, KVVII/y	Eal			(41) X (31	) x (52) x (	JJ) =	-	0		(54) (55)		
Water storage	` , ` `	,	for each	month			((56)m = (	(55) × (41)ı	m		<u> </u>	I	(00)		
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)		
If cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (	H11)] ÷ (5	0), else (5	7)m = (56)	m where (	H11) is fro	m Append	ix H			
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)		
Primary circui	t loss (ar	nnual) fro	m Table	e 3				•			0		(58)		
Primary circui					•	. ,	, ,								
(modified by	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		1			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)		
Combi loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41)	)m	ı	ī	ī	ı	1			
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)		
	1		<del></del>				<del>`</del>		<del>`                                    </del>	<del>`                                    </del>	<del>`</del>	(59)m + (61)m	(00)		
(62)m= 110.22	96.4	99.47	86.72	83.21	71.81	66.54	76.36	77.27	90.05	98.29	106.74	I	(62)		

	Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G)													
`	1	1	·	i	applie	s, see Ap	<del>i                                     </del>	<del></del>			1	1		
(63)m= 0	0	0	0	0	0	0	C	0	0	0	0		(63)	
Output from	water hea	iter		•		_				_		•		
(64)m= 110.2	2 96.4	99.47	86.72	83.21	71.81	66.54	76.	36 77.27	90.05	98.29	106.74		_	
								Output from v	water hea	ter (annual)	112	1063.09	(64)	
Heat gains f	rom water	heating	, kWh/m	onth 0.2	5 ′ [0.8	5 × (45)m	+ (6	1)m] + 0.8	x [(46)r	m + (57)m	+ (59)m	]		
(65)m= 27.55	24.1	24.87	21.68	20.8	17.95	16.64	19.	09 19.32	22.51	24.57	26.69		(65)	
include (5	7)m in cal	culation	of (65)m	only if c	ylinder	is in the	dwell	ing or hot v	water is	from com	nmunity h	eating		
5. Internal	gains (see	e Table 5	and 5a	):										
Metabolic ga	ins (Table	e 5), Wat	ts		,				,			1		
Jar	Feb	Mar	Apr	May	Jun	Jul	Α	ug Sep	Oct	Nov	Dec			
(66)m= 95.35	95.35	95.35	95.35	95.35	95.35	95.35	95.	35 95.35	95.35	95.35	95.35		(66)	
Lighting gair	ıs (calcula	ted in A	opendix	L, equat	ion L9	or L9a), a	lso s	ee Table 5				_		
(67)m= 15.08	13.39	10.89	8.24	6.16	5.2	5.62	7.3	9.81	12.45	14.53	15.49		(67)	
Appliances (	gains (calc	culated in	Append	dix L, eq	uation l	_13 or L1	3a),	also see Ta	able 5					
(68)m= 166.3	2 168.05	163.7	154.44	142.75	131.77	124.43	122	2.7 127.05	136.3	1 148	158.98		(68)	
Cooking gai	ns (calcula	ated in A	ppendix	L, equa	tion L15	or L15a	), als	o see Tabl	e 5	-		•		
(69)m= 32.53	32.53	32.53	32.53	32.53	32.53	32.53	32.	53 32.53	32.53	32.53	32.53		(69)	
Pumps and	ans gains	(Table	5а)	•	•	•		•	•	•	•			
(70)m= 0	0	0	0	0	0	0	C	0	0	0	0		(70)	
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)	-!					!			
(71)m= -76.2	8 -76.28	-76.28	-76.28	-76.28	-76.28	-76.28	-76	28 -76.28	-76.28	3 -76.28	-76.28		(71)	
Water heatir	ng gains (1	rable 5)							•			I		
(72)m= 37.04	<del></del>	33.43	30.11	27.96	24.93	22.36	25.	66 26.83	30.26	34.13	35.87		(72)	
Total intern	al gains =	:		ı	(6)	6)m + (67)n	1 + (68	B)m + (69)m +	· (70)m +	(71)m + (72	)m	_		
(73)m= 270.0	_ <del>_</del>	259.62	244.4	228.48	213.51	204.01	207	.27 215.29	230.6	2 248.27	261.95		(73)	
6. Solar ga						<u> </u>								
Solar gains ar		using sola	r flux from	Table 6a	and asso	ciated equa	tions	to convert to t	the applic	able orienta	tion.			
Orientation:			Area			ux		<b>g</b> _		FF		Gains		
	Table 6d		m²		Ta	able 6a		Table 6b	)	Table 6c		(W)		
North 0.9	0.77	Х	10.	64	x	10.63	x	0.63	X	0.7	=	34.58	(74)	
North 0.9	0.77	х	10.	64	x	20.32	х	0.63	x	0.7	=	66.08	(74)	
North 0.9	0.77	х	10.	64	x	34.53	x	0.63	X	0.7	=	112.28	(74)	
North 0.9	0.77	х	10.	64	x	55.46	x	0.63	x	0.7		180.35	(74)	
North 0.9	0.77	Х	10.	64	х	74.72	x	0.63	x	0.7		242.95	(74)	
North 0.9	0.77	х	10.	64	х	79.99	x	0.63	x	0.7	=	260.09	(74)	
North 0.9	0.77		64	x	74.68	x	0.63	×	0.7	=	242.83	(74)		
	0.77												_	
North 0.9		_	10.	64	х	59.25	x	0.63	X	0.7		192.65	(74)	
North 0.9	0.77	×	10.		x x	59.25 41.52	x x	0.63	x x		= =	192.65 135	(74) (74)	
	0.77	x x	10.	64	x		, 1		=	0.7 0.7 0.7	=		=	

North	0.9x	0.77	x	10.	64	X	1	3.12	x		0.63		x [	0.7	=	42.65	(74)
North	0.9x	0.77	x	10.	64	X		8.86	x		0.63	_	х 🗖	0.7		28.82	(74)
	_												_				
Solar g	gains in	watts, ca	alculated	for eac	h month	1			(83)m	= St	um(74)m .	(82	)m				
(83)m=	34.58	66.08	112.28	180.35	242.95	2	260.09	242.83	192	.65	135	78	.66	42.65	28.82	7	(83)
Total g	jains – i	nternal a	and solar	(84)m =	= (73)m	+ (	83)m	, watts								_	
(84)m=	304.61	334.98	371.9	424.75	471.43	4	473.6	446.84	399	.92	350.29	309	9.28	290.92	290.77		(84)
7. Me	an inter	nal temp	perature	(heating	seasor	n)											
Temp	erature	during h	neating p	eriods ir	n the liv	ing	area	from Tab	ole 9,	Th	1 (°C)					21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	ea, h1,n	า (ร	see Ta	ıble 9a)									
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Αι	ug	Sep	C	Oct	Nov	Dec	; ]	
(86)m=	0.97	0.96	0.93	0.86	0.72	T	0.55	0.42	0.4	.8	0.72	0.	.9	0.96	0.98	7	(86)
Mean	interna	l temner	ature in	living an	ea T1 /f	مااد	nw ste	ns 3 to 7	' 7 in T	able	2 9c)				!	_	
(87)m=	19.3	19.5	19.86	20.35	20.73	$\overline{}$	20.92	20.98	20.9	-	20.81	20	.33	19.75	19.29	٦	(87)
		<u> </u>	<u> </u>		<u> </u>			!		!		<u> </u>				_	
	20.24	20.25	eating p	eriods ir 20.27	20.27	_	veiling 20.28	20.28	20.2		12 (°C) 20.28	20	.27	20.26	20.26	٦	(88)
(88)m=		<u> </u>	<u> </u>		<u> </u>			!	<u> </u>	29	20.20	20	.21	20.26	20.20		(00)
Utilisa	ation fac	tor for g	ains for i	rest of d	welling,	h2	,m (se	e Table	9a)					1		_	
(89)m=	0.97	0.95	0.92	0.84	0.69		0.5	0.35	0.4	.1	0.67	0.	88	0.95	0.97		(89)
Mean	interna	l temper	ature in	the rest	of dwel	ling	T2 (f	ollow ste	ps 3	to 7	in Tabl	e 90	<b>c</b> )				
(90)m=	18.67	18.87	19.22	19.71	20.05		20.23	20.27	20.2	27	20.14	19	9.7	19.13	18.66	7	(90)
										•	f	LA =	Livin	g area ÷ (4	4) =	0.51	(91)
Mean	interna	l temner	ature (fo	r the wh	ole dwe	ıllin	na) – f	Ι Δ <b>ν</b> Τ1	+ (1	_ fl	A) × T2						
(92)m=	18.99	19.19	19.55	20.04	20.4	_	20.59	20.63	20.0	_	20.48	20	.02	19.45	18.98	٦	(92)
` '		<u> </u>	he mean			1		l								_	, ,
(93)m=	18.99	19.19	19.55	20.04	20.4	_	20.59	20.63	20.0		20.48	· ·	.02	19.45	18.98	٦	(93)
		tina real	uirement														
			ternal ter		re obtai	nec	d at st	ep 11 of	Tabl	e 9b	o, so tha	t Ti.	m=(	76)m an	d re-ca	lculate	
			or gains								.,	,	(				
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	С	Oct	Nov	Dec	;	
Utilisa	ation fac	tor for g	ains, hm	:				_								_	
(94)m=	0.96	0.94	0.91	0.83	0.69		0.52	0.39	0.4	4	0.68	0.	87	0.94	0.96		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m											_	
(95)m=	292.35	316.43	338.72	352.54	326.78	2	245.86	172.36	177.	.35	239.38	270	0.29	274.26	280.45	<u>;</u>	(95)
Month	hly aver	age exte	rnal tem	perature	from T	ab	le 8									_	
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.	4	14.1	10	0.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Ln	า , W =	=[(39)m	x [(93	3)m-	– (96)m	]				_	
(97)m=	683.55	661.59	601.1	501.32	389.73		262.66	176.92	184		282.22		2.03	558.31	674.38	}	(97)
Space		<del></del>	ement fo		1	Wh		th = 0.02	24 x [	(97)	m – (95	Ė		·		_	
(98)m=	291.05	231.95	195.21	107.13	46.83		0	0	0		0	11	2.9	204.52	293.08	<u> </u>	
										Total	l per year	(kWh	ı/year	) = Sum(9	8)15,912	= 1482.66	(98)
Space	e heatin	g require	ement in	kWh/m²	<sup>2</sup> /year											25.83	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

1													•	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	Lm (ca	lculated	using 25	5°C inter	nal temp	erature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	412.52	324.75	332.22	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.9	0.94	0.92	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) = (	(100)m x	(101)m									
(102)m=	0	0	0	0	0	372.28	304.58	304.75	0	0	0	0		(102)
Gains	(solar o	gains cal	culated	for appli	cable we	eather re	gion, se	e Table	10)	•			•	
(103)m=	0	0	0	0	0	625.09	592.44	538.73	0	0	0	0		(103)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$														
(104)m=	0	0	0	0	0	182.03	214.17	174.08	0	0	0	0		
'									Total	= Sum(	104)	=	570.27	(104)
Cooled	I fraction	า							f C =	cooled	area ÷ (4	<b>1</b> ) =	1	(105)
Intermi	ttency f	actor (Ta	able 10b	)						_	_			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
'									Total	l = Sum(	104)	=	0	(106)
Space	cooling	requiren	nent for	month =	(104)m	× (105)	× (106)r	n		_				
(107)m=	0	0	0	0	0	45.51	53.54	43.52	0	0	0	0		
									Total	= Sum(	107)	=	142.57	(107)
Space	cooling	requiren	nent in k	:Wh/m²/y	/ear				(107)	÷ (4) =			2.48	(108)
8f. Fab	ric Ener	gy Effici	ency (ca	alculated	only un	der spec	cial cond	litions, se	ee sectio	on 11)				
Fabrio	Energy	/ Efficier	псу						(99)	+ (108) =	=		28.32	(109)

			llser F	Details:						
Assessor Name:	John Ashe		OSCI L	Strom	a Num	hori		STD()	031268	
Software Name:	Stroma FSAP	2012		Softwa					on: 1.0.5.8	
			roperty	Address			ETTS W			
Address :										
1. Overall dwelling dime	ensions:									
0 14				a(m²)	1		ight(m)	٦	Volume(m³)	_
Ground floor				57.39	(1a) x	2	.66	(2a) =	152.66	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)-	+(1e)+(1r	n) <u></u>	57.39	(4)					
Dwelling volume					(3a)+(3b	)+(3c)+(3d	l)+(3e)+	.(3n) =	152.66	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	ſ
Number of chimneys		0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0	0	Ī + [	0	Ī = [	0	x	20 =	0	(6b)
Number of intermittent fa	ans					0	x .	10 =	0	(7a)
Number of passive vents	6				F	0	x -	10 =	0	    (7b)
Number of flueless gas f	ïres				F	0	x 4	40 =	0	[7c)
gar i					L					
								Air ch	nanges per ho	ur
Infiltration due to chimne	eys, flues and fans	= (6a)+(6b)+(7	a)+(7b)+(	(7c) =	Γ	0		÷ (5) =	0	(8)
If a pressurisation test has		tended, procee	d to (17),	otherwise o	continue fr	om (9) to (	(16)			_
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration Structural infiltration: (	) 25 for atom or time	har frama ar	0 2E to	r maaan	n, constr	ustion	[(9)	-1]x0.1 =	0	(10)
if both types of wall are p					•	uction			0	(11)
deducting areas of open	ings); if equal user 0.35	,	J		`					_
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	·								0	(13)
Percentage of window Window infiltration	s and doors draugi	nt strippea		0.25 - [0.2	y (14) ± 1	1001 -			0	(14)
Infiltration rate				•	, ,	12) + (13) -	+ (15) =		0	(15)
Air permeability value	a50. expressed in	cubic metre	s per ho					area	5	(17)
If based on air permeabi	•		•	•	•				0.25	(18)
Air permeability value appli						is being u	sed			<b>_</b>
Number of sides shelter	ed			(00)	50.07E (	10)1			0	(19)
Shelter factor				(20) = 1 -		19)] =			1	(20)
Infiltration rate incorpora	-	1		(21) = (18	) X (20) =				0.25	(21)
Infiltration rate modified	<del></del>	<u> </u>	1	1 1	Con	Oct	Nov	Doo	1	
Jan Feb		lay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp (22)m= 5.1 5	beed from Table 7 4.9 4.4 4.	3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(22)111= 3.1 3	7.5 4.4 4.	3.0	3.0	3.1	<u> </u>	4.3	4.0	4.7	I	
Wind Factor (22a)m = (2	22)m ÷ 4								_	
(22a)m= 1.27 1.25	1.23 1.1 1.0	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infilt	Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m													
0.32	0.31	0.31	0.28	0.27	0.24	0.24	0.23	0.25	0.27	0.28	0.29			
Calculate effe	ective air	change i	rate for t	he appli	cable ca	se			_					
If mechanic			l' N. (0	OL) (00	\ <b>-</b> (	(1)	15// (1	. (00)	\ (00 \			0.5	(23a)	
If exhaust air I									) = (23a)			0.5	(23b)	
If balanced wi		-	-	_								77.35	(23c)	
a) If balanc						<del></del>	<del></del>	<u> </u>	<del> </del>	<del>- ^ -</del>	<u>`</u>	÷ 100]		
(24a)m= 0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(24a)	
b) If balanc	1	1			i	<del></del>	<del>- ^ `                                  </del>	<u> </u>	<del>r `</del>	<del>-                                    </del>	<u> </u>	1	(0.41-)	
(24b)m = 0	0	0	0	0		0	0	0	0	0	0		(24b)	
c) If whole if (22h)	house ex m < 0.5 >			•	•				5 x (23h	<b>)</b>				
(24c)m = 0		(24c)												
d) If natural	L Lventilati	on or wh	ole hous	L nositiv	l /e input	L ventilatio	n from l	oft	ļ	<u> </u>	<u> </u>			
,				•	•				0.5]					
if $(22b)m = 1$ , then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$ $(24d)m = 0                                  $														
Effective ai	r change	rate - er	nter (24a	) or (24b	o) or (24	c) or (24	d) in box	(25)						
(25)m= 0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(25)	
3. Heat loss	es and he	eat loss r	paramete	er:										
ELEMENT	Gro		Openin		Net Ar	ea	U-valı	re	AXU		k-value	e A.	X k	
	area	(m²)	m		A ,r		W/m2		(W/I	K)	kJ/m²-l			
Windows					10.64	х1.	/[1/( 0.9 )+	0.04] =	9.24				(27)	
Walls	25.8	33	10.6	4	15.19	) X	0.15	=	2.28				(29)	
Total area of	elements	s, m²			25.83	3							(31)	
* for windows an ** include the are						ated using	ı formula 1,	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2		
Fabric heat lo	ss, W/K	= S (A x	U)				(26)(30)	+ (32) =				11.52	(33)	
Heat capacity	Cm = S	(A x k )						((28)	(30) + (32	2) + (32a).	(32e) =	911.4	(34)	
Thermal mass	s parame	eter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value:	: Low		100	(35)	
For design asses				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f			
Thermal bridg	ges : S (L	.xY) cal	culated (	using Ap	pendix l	<						3.87	(36)	
if details of therm		are not kn	own (36) =	= 0.05 x (3	1)								_	
Total fabric h									(36) =			15.4	(37)	
Ventilation he	1	1							= 0.33 × (	1		1		
Jan 24.76	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(38)	
(38)m= 21.76	21.45	21.13	19.56	19.24	17.67	17.67	17.35	18.3	19.24	19.87	20.5		(30)	
Heat transfer	1	1			1				= (37) + (3	r	1	1		
(39)m= 37.16	36.84	36.53	34.96	34.64	33.07	33.07	32.75	33.7	34.64	35.27	35.9	0.1.00	7(00)	
Heat loss par	ameter (I	HLP), W	m²K						Average = = (39)m ÷		12 /12=	34.88	(39)	
(40)m= 0.65	0.64	0.64	0.61	0.6	0.58	0.58	0.57	0.59	0.6	0.61	0.63			
Number of da	ys in mo	nth (Tah	le 1a)			-			Average =	Sum(40) <sub>1</sub>	12 /12=	0.61	(40)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			

(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)	
4 \Matax back		<b></b>									14\A/b /	2011		
4. Water heat	ing ene	rgy requi	rement:								kWh/ye	ear:		
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (1	ΓFA -13.		91		(42)	
Annual averag Reduce the annua not more that 125	e hot wa al average	hot water	usage by	5% if the $a$	lwelling is	designed t			se target o		.49		(43)	
				1		·	Α.		0.1	NI.				
	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)													
(44)111= 07.44														
Energy content of	Total = $Sum(44)_{112}$ = inergy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)													
(45)m= 129.67														
		<u> </u>	<u> </u>	<u>I</u>	<u>I</u>	Į	<u>I</u>		Γotal = Su	m(45) <sub>112</sub> =	 =	1250.69	(45)	
If instantaneous w	ater heati	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46	) to (61)					_	
(46)m= 19.45	17.01	17.55	15.3	14.68	12.67	11.74	13.47	13.64	15.89	17.35	18.84		(46)	
Water storage					/\/\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-1	10.1.		1			· I		
Storage volum	` '		•			•		ame ves	sei		0		(47)	
If community h	_			_			` '	oro) onto	or 'O' in /	<b>47</b> \				
Otherwise if no Water storage		not wate	וו פוווט) ופ	iciudes i	HStaritar	ieous co	ווטט וטוווי	ers) erite	) III (·	47)				
a) If manufact		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)	
Temperature f					`	, , ,					0		(49)	
Energy lost fro				ear			(48) x (49)	) =			10		(50)	
b) If manufact		_	-		or is not		( -) ( -,	,			10		(00)	
Hot water stora	_			le 2 (kW	h/litre/da	ıy)				0.	02		(51)	
If community h	•		on 4.3									•		
Volume factor			Ol-							-	03		(52)	
Temperature fa										0	.6		(53)	
Energy lost fro		•	, kWh/ye	ear			(47) x (51)	) x (52) x (	53) =	-	03		(54)	
Enter (50) or (	. , .	•					((50)	55) (44)		1.	03		(55)	
Water storage							·····	55) × (41)r				ı		
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	ļ 	(56)	
If cylinder contains	s dedicate	d solar sto	rage, (57)i	m = (56)m	x [(50) – (	H11)] ÷ (5	0), else (5	/)m = (56)	m where (	H11) is fro	m Append	ıx H		
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)	
Primary circuit	loss (ar	nnual) fro	m Table	∋ 3							0		(58)	
Primary circuit	loss cal	culated t	for each	month (	59)m = (	(58) ÷ 36	65 × (41)	m						
(modified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)				
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)	
Combi loss ca	lculated	for each	month (	(61)m =	(60) ÷ 36	65 × (41)	)m							
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)	
Total heat requ	uired for	water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 × (	(45)m +	(46)m +	(57)m +	(59)m + (61)m		
(62)m= 184.95	163.34	172.31	155.52	153.18	137.97	133.56	145.11	144.4	161.22	169.13	180.86		(62)	
						1	1				1	ı		

Solar DHW input calculated using	Appendix G	or Appendix	H (negati	ve quantity	/) (ent	ter '0'	if no solar	contribu	ution to wate	er heating)		
(add additional lines if FGH	RS and/or	WWHRS	applies	, see Ap	pend	dix G	i)					
(63)m= 0 0 0	0	0	0	0	0		0	0	0	0	]	(63)
Output from water heater	•	'		•	•				•	•	•	
(64)m= 184.95 163.34 172	.31 155.52	153.18	137.97	133.56	145	.11	144.4	161.22	169.13	180.86	]	
<b> </b>	! 					Outpu	ut from wa	ter heat	er (annual) <sub>1</sub>	12	1901.53	(64)
Heat gains from water heat	ing, kWh/n	nonth 0.25	5 ´ [0.85	× (45)m	+ (6	31)m]	] + 0.8 x	[(46)n	n + (57)m	+ (59)m	n]	
(65)m= 87.34 77.65 83.	13 76.72	76.77	70.88	70.25	74.	09	73.02	79.45	81.25	85.98	]	(65)
include (57)m in calculati	on of (65)r	n only if cy	ylinder i	s in the o	dwell	ling c	or hot wa	ater is	from com	munity h	neating	
5. Internal gains (see Tab	le 5 and 5	a):										
Metabolic gains (Table 5), \	Watts											
	ar Apr	May	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
(66)m= 95.35 95.35 95.3	35 95.35	95.35	95.35	95.35	95.	35	95.35	95.35	95.35	95.35		(66)
Lighting gains (calculated in	n Appendix	L, equati	on L9 o	r L9a), a	lso s	ee T	able 5		•		•	
(67)m= 15.08 13.39 10.4	89 8.24	6.16	5.2	5.62	7.3	31	9.81	12.45	14.53	15.49	]	(67)
Appliances gains (calculate	d in Apper	ıdix L, equ	uation L	13 or L1	3a),	also	see Tab	ole 5	•		•	
(68)m= 166.32 168.05 163	3.7 154.44	142.75	131.77	124.43	122	2.7	127.05	136.31	148	158.98	]	(68)
Cooking gains (calculated i	n Appendix	L, equati	ion L15	or L15a)	, als	o se	e Table	5			•	
(69)m= 32.53 32.53 32.5	53 32.53	32.53	32.53	32.53	32.	53	32.53	32.53	32.53	32.53	]	(69)
Pumps and fans gains (Tab	ole 5a)						•		•	•	•	
(70)m= 0 0 0	0	0	0	0	0		0	0	0	0	]	(70)
Losses e.g. evaporation (ne	egative val	ues) (Tabl	le 5)	•			•		•	•	•	
(71)m= -76.28 -76.28 -76.	.28 -76.28	-76.28	-76.28	-76.28	-76	.28	-76.28	-76.28	-76.28	-76.28	]	(71)
Water heating gains (Table	5)	•					•		•		•	
(72)m= 117.39 115.55 111	.74 106.55	103.19	98.45	94.42	99.	58	101.42	106.78	112.84	115.56	]	(72)
Total internal gains =	-		(66)	m + (67)m	+ (68	3)m +	(69)m + (7	70)m + (	(71)m + (72)	m	-	
(73)m= 350.39 348.59 337	.93 320.84	303.71	287.02	276.08	281	1.2	289.88	307.15	326.98	341.64	]	(73)
6. Solar gains:												
Solar gains are calculated using	solar flux fror	n Table 6a a	and assoc	iated equa	tions	to cor	nvert to the	e applica		ion.		
Orientation: Access Facto			Flu				g_ black	-	FF		Gains	
Table 6d	m²			ole 6a		l 6	able 6b		Table 6c		(W)	_
North 0.9x 0.77	X 10	0.64	x1	0.63	X		0.63	x	0.7	=	34.58	(74)
North 0.9x 0.77	X 10	0.64	x 2	.0.32	X		0.63	x	0.7	=	66.08	(74)
North 0.9x 0.77	x 10	0.64	x 3	34.53	X		0.63	x	0.7	=	112.28	(74)
North 0.9x 0.77	× 10	0.64	x5	5.46	X		0.63	X	0.7	=	180.35	(74)
North 0.9x 0.77	x 10	0.64	x 7	4.72	X		0.63	x	0.7	=	242.95	(74)
North 0.9x 0.77	x 10	0.64	x 7	9.99	x		0.63	x [	0.7	=	260.09	(74)
North 0.9x 0.77	x 10	0.64	x 7	'4.68	x		0.63	x [	0.7	=	242.83	(74)
North 0.9x 0.77	x 10	0.64	x 5	9.25	X		0.63	x [	0.7	=	192.65	(74)
North 0.9x 0.77	x 10	0.64	X 4	1.52	X		0.63	x [	0.7	=	135	(74)
North 0.9x 0.77	× 10	).64	x 2	4.19	X		0.63	x [	0.7	=	78.66	(74)

North	0.9x	0.77	x	10.	64	x [	13.	12	x	0.63	x [	0.7	=	42.65	(74)
North	0.9x	0.77	х	10.	64	x	8.8	36	X	0.63	x	0.7	=	28.82	(74)
	_					_									<u>_</u>
Solar	gains in	watts, ca	alculated	I for eac	h month	1			(83)m =	Sum(74)m	(82)m				
(83)m=	Ť	66.08	112.28	180.35	242.95	$\overline{}$	0.09	242.83	192.65	135	78.66	42.65	28.82	]	(83)
Total g	gains – i	nternal a	and solar	(84)m =	= (73)m	+ (8	3)m , v	watts		-1		·		1	
(84)m=	384.97	414.67	450.21	501.2	546.66	54	7.11	518.9	473.85	424.88	385.81	369.63	370.47	]	(84)
7. Me	ean inter	nal temp	perature	(heating	season	n)									
Temp	erature	during h	neating p	eriods ir	n the livi	ng a	area fro	om Tab	ole 9, T	h1 (°C)				21	(85)
Utilisa	ation fac	ctor for a	ains for l	living are	ea. h1.m	ı (se	e Tabl	le 9a)		. ,					
	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Aug	Sep	Oct	Nov	Dec	]	
(86)m=	0.93	0.91	0.86	0.73	0.56	+	.38	0.28	0.32	0.53	0.77	0.9	0.94		(86)
, ,		<u> </u>			<u> </u>	1			ļ	ļ	<u> </u>	<u>I</u>	<u> </u>	]	
		<del></del>	ature in		,	1	i			<del>-                                    </del>	T 00.70	1 00 00	00.00	1	(07)
(87)m=	20.02	20.18	20.45	20.78	20.94	20	0.99	21	21	20.97	20.76	20.39	20.03	]	(87)
Temp	erature	during h	neating p	eriods ir	rest of	dwe	elling fi	rom Ta	ble 9,	Γh2 (°C)		_		_	
(88)m=	20.39	20.39	20.4	20.42	20.43	20	0.45	20.45	20.46	20.44	20.43	20.42	20.41		(88)
Utilisa	ation fac	ctor for a	ains for	rest of d	welling,	h2,r	m (see	Table	9a)						
(89)m=	0.93	0.9	0.84	0.71	0.53	1	.35	0.24	0.28	0.49	0.75	0.88	0.93	1	(89)
Moon	intorno	l tompor	oturo in	the rest	of dwall	ina .	T2 /fall	low oto	no 2 to	7 in Tob	lo ()o)	ı		1	
	19.06	19.3	19.68	20.15	20.35	Ť	<del>`</del>	20.45	20.45	7 in Tab	20.14	19.62	19.09	1	(90)
(90)m=	19.00	19.3	19.00	20.15	20.35		J.44	20.43	20.45		ļ	ng area ÷ (		0.54	``
											ILA – LIVII	ig area + (	<del></del> )	0.51	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fL <i>P</i>	\ × T1	+ (1 – 1	LA) × T2		_		-	
(92)m=	19.54	19.75	20.07	20.47	20.65	20	0.72	20.73	20.73	20.69	20.46	20.01	19.57		(92)
Apply	/ adjustn	ment to t	he mean	interna	l temper	atur	re from	Table	4e, wh	ere appr	opriate	_		-	
(93)m=	19.54	19.75	20.07	20.47	20.65	20	0.72	20.73	20.73	20.69	20.46	20.01	19.57		(93)
8. Sp	ace hea	iting requ	uirement												
						ned	at step	11 of	Table 9	b, so tha	at Ti,m=(	76)m an	d re-cal	culate	
the u		1	or gains							1		1		1	
	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec	]	
		<u>_</u>	ains, hm		1	_				1		1		1	(0.4)
(94)m=	0.91	0.89	0.83	0.71	0.54	0	.37	0.26	0.3	0.51	0.75	0.87	0.92	]	(94)
		1	, W = (9 <sup>2</sup>	<u> </u>	r	1			ı	1	1	i	1	1	(0-)
(95)m=	352.18	368.56	374.96	354.74	295.91			136.18	141.24	214.66	289.7	323.18	341.28		(95)
		<del></del>	ernal tem		T T	$\overline{}$			1	_			1	1	
(96)m=	4.3	4.9	6.5	8.9	11.7	1.	4.6	16.6	16.4	14.1	10.6	7.1	4.2	]	(96)
Heat						_	<del></del>	` ,	<del>- `                                   </del>	n– (96)m		i		1	
	566.47	547.12	495.87	404.39	310.07	20	2.42	136.54	141.83	222.08	341.45	455.36	551.69	1	(97)
(97)m=		<u> </u>			ļ									]	
		g require	ement fo	r each n	nonth, k	Wh/	month	= 0.02	24 x [(9	7)m – (95	)m] x (4	1)m	1	J 1	
		<u> </u>			ļ	1	month 0	0.02	24 x [(9 <sup>-</sup>	7)m – (95 0	5)m] x (4 38.51	1)m 95.18	156.54	]	
Spac	e heatin	g require	ement fo	r each n	nonth, k	1			0	<del>í `</del>	38.51	95.18		705.89	(98)
Spac (98)m=	e heatin 159.44	g require	ement fo	r each n 35.75	nonth, k'	1			0	0	38.51	95.18		705.89	(98)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

			_
Fraction of space heat from secondary/supplementary heating (	Table 11) '0' if none	0	(301)
Fraction of space heat from community system $1 - (301) =$		1	(302)
The community scheme may obtain heat from several sources. The procedure a includes boilers, heat pumps, geothermal and waste heat from power stations.		s; the latter	
Fraction of heat from Community boilers	iso ripportant c.	0.4	(303a)
Fraction of community heat from heat source 2		0.4	(303b)
Fraction of total space heat from Community boilers	(302) x (303a) =	0.4	(304a)
Fraction of total space heat from community heat source 2	$(302) \times (303b) =$	0.4	(304b)
Factor for control and charging method (Table 4c(3)) for commu	nity heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	n	1.05	(306)
Space heating		kWh/year	_
Annual space heating requirement		705.89	
Space heat from Community boilers	(98) x (304a) x (305) x (306) =	296.48	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	296.48	(307b)
Efficiency of secondary/supplementary heating system in % (from	m Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary systematics	em (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement		1901.53	7
If DHW from community scheme:			_
Water heat from Community boilers	(64) x (303a) x (305) x (306) =	798.64	(310a)
Water heat from heat source 2	$(64) \times (303b) \times (305) \times (306) =$	798.64	(310b)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)]	= 21.9	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	outside	209.52	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	209.52	(331)
Energy for lighting (calculated in Appendix L)		266.24	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-559.63	(333)
Electricity generated by wind turbine (Appendix M) (negative qua	antity)	0	(334)
12b. CO2 Emissions – Community heating scheme			
	Energy Emission facto kWh/year kg CO2/kWh	r Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)	two fuels repeat (363) to (366) for the second f	uel	7,207-
(1.)			](367a ](367a
Efficiency of heat source 2 (%)  If there is CHP using	two fuels repeat (363) to (366) for the second f	uei 89	(367b)

CO2 associated with heat source 1	[(307)	b)+(310b)] x 100 ÷ (367b) x	0.22	=	265.78	(367)
CO2 associated with heat source 2	[(307)	b)+(310b)] x 100 ÷ (367b) x	0.22	=	265.78	(368)
Electrical energy for heat distribution		[(313) x	0.52	=	11.37	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	)	=	542.93	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	vater heating	(373) + (374) + (375) =			542.93	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	108.74	(378)
CO2 associated with electricity for lighting	ing	(332))) x	0.52	=	138.18	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appl		0.52 × 0.01	I =	-290.45	(380)
Total CO2, kg/year	sum of (376)(382) =				499.41	(383)
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				8.7	(384)
El rating (section 14)					93.46	(385)

User Details: John Ashe **Assessor Name:** Stroma Number: STRO031268 Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.8 Property Address: Unit 3 - COPPETTS WOOD, London Address: 1. Overall dwelling dimensions Area(m²) Av. Height(m) Volume(m³) Ground floor (1a) x (2a) = 152.66 (3a) 57.39 2.66 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)(4)57.39 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =152.66 (5) total main secondary other m³ per hour heating heating x 40 =Number of chimneys (6a) 0 0 x 20 =Number of open flues 0 O O 0 0 (6b) Number of intermittent fans x 10 =(7a) 2 20 x 10 =Number of passive vents (7b) 0 0 x 40 =Number of flueless gas fires (7c)Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = $\div$  (5) = (8) 0.13 If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9) O Additional infiltration (10)[(9)-1]x0.1 =0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)0 if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 (13)O Percentage of windows and doors draught stripped (14)0 Window infiltration  $0.25 - [0.2 \times (14) \div 100] =$ 0 (15)Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =O (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then  $(18) = [(17) \div 20] + (8)$ , otherwise (18) = (16)0.38 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0  $(20) = 1 - [0.075 \times (19)] =$ Shelter factor (20)1  $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.38 Infiltration rate modified for monthly wind speed Jan Feb Jul Sep Mar Apr Mav Jun Aug Oct Nov Dec Monthly average wind speed from Table 7 (22)m =5.1 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor  $(22a)m = (22)m \div 4$ (22a)m 1.27 1.25 1.23 1.08 0.95 0.95 0.92 1 1.08 1.12 1.1 1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21)	x (22a)m
0.49 0.48 0.47 0.42 0.41 0.36 0.36 0.	0.38 0.41 0.43 0.45
Calculate effective air change rate for the applicable case	
If mechanical ventilation:	0 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)),	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Tab	(200)
a) If balanced mechanical ventilation with heat recovery (MVHR)  (24a)m= 0 0 0 0 0 0 0	$4a)m = (22b)m + (23b) \times [1 - (23c) \div 100]$ $0                                    $
b) If balanced mechanical ventilation without heat recovery (MV)	
(24b)m= 0 0 0 0 0 0 0 0	
c) If whole house extract ventilation or positive input ventilation from	
if $(22b)m < 0.5 \times (23b)$ , then $(24c) = (23b)$ ; otherwise $(24c) =$	
(24c)m= 0 0 0 0 0 0 0	0 0 0 0 (24c)
d) If natural ventilation or whole house positive input ventilation fr	n loft
if $(22b)m = 1$ , then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5$	(22b)m² x 0.5]
(24d)m= 0.62 0.61 0.61 0.59 0.58 0.57 0.57 0.	0.57 0.58 0.59 0.6 (24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) ir	ox (25)
(25)m= 0.62 0.61 0.61 0.59 0.58 0.57 0.57 0.	0.57 0.58 0.59 0.6 (25)
3. Heat losses and heat loss parameter:	
	alue A X U k-value A X k
	n2K (W/K) kJ/m²-K kJ/K
	)+0.04] =
	8 = 2.73 (29)
Total area of elements, m <sup>2</sup> 25.83	(31)
* for windows and roof windows, use effective window U-value calculated using form.  ** include the areas on both sides of internal walls and partitions	1/[(1/U-value)+0.04] as given in paragraph 3.2
•	30) + (32) =
Heat capacity Cm = S(A x k)	((28)(30) + (32) + (32a)(32e) = 911.4 (34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicative Value: Medium 250 (35)
For design assessments where the details of the construction are not known precise	he 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	1.29 (36)
if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss	(33) + (36) = 18.13 (37)
Ventilation heat loss calculated monthly	$(38)m = 0.33 \times (25)m \times (5)$
Jan Feb Mar Apr May Jun Jul A	<del>                                      </del>
(38)m= 31.13 30.9 30.68 29.61 29.41 28.49 28.49 28	
Heat transfer coefficient, W/K	(39)m = (37) + (38)m
(39)m= 49.26 49.03 48.81 47.74 47.55 46.62 46.62 46	
	1000 1000 1000
Heat loss parameter (HLP), W/m²K	Average = $Sum(39)_{112}/12=$ 47.74 (39)
rieat ioss parameter (FILE), William	Average = Sum(39) <sub>112</sub> /12= 47.74 (39) (40)m = (39)m $\div$ (4)
(40)m= 0.86 0.85 0.85 0.83 0.83 0.81 0.81 0.	$ (40)m = (39)m \div (4) $ $ 0.82                                   $
(40)m= 0.86 0.85 0.85 0.83 0.83 0.81 0.81 0.	(40)m = $(39)$ m ÷ $(4)$
	$(40)m = (39)m \div (4)$ $0.82  0.83  0.84  0.84$ $Average = Sum(40)_{112}/12 = 0.83$ $(40)$

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ater heat	ing ene	rgy requ	irement:								kWh/ye	ear:	
if TF		9, N = 1		([1 - exp	o(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (¯	TFA -13.		91		(42)
	A £ 13.9 I averag	•	ater usad	ae in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		70	.49		(43)
Reduce	the annua	ıl average	hot water	usage by	5% if the d	lwelling is	designed t			se target o		. 10		( - /
notmore	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water				<u> </u>	Vd,m = fa				Гоер	Oct	INOV	Dec		
(44)m=	87.44	84.26	81.08	77.9	74.72	71.54	71.54	74.72	77.9	81.08	84.26	87.44		
Fneray (	content of	hot water	used - cal	lculated m	onthly = 4.	190 x Vd.r	n x nm x F.	Tm / 3600		Total = Sui			953.88	(44)
(45)m=	129.67	113.41	117.03	102.03	97.9	84.48	78.28	89.83	90.9	105.94	115.64	125.58		
( - /			1	1	1					Total = Su		l	1250.69	(45)
If instan	taneous w	ater heati		t of use (n	o hot water	r storage),	enter 0 in	boxes (46	to (61)		•		1	_
(46)m= Water	19.45 storage	17.01	17.55	15.3	14.68	12.67	11.74	13.47	13.64	15.89	17.35	18.84		(46)
	•		) includir	ng any s	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If com	munity h	eating a	and no ta	ank in dv	velling, e	nter 110	litres in	(47)						
			hot water	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (	47)			
	storage		eclared I	oss fact	or is kno	wn (kW/h	n/day).				1	39		(48)
,			m Table		01 10 1(110	WII (ICVVI	ı, day).					54		(49)
•			r storage		ear			(48) x (49)	) =			75		(50)
				-	loss fact									
		-	s factor fi see secti		le 2 (kW	h/litre/da	ay)					0		(51)
	e factor	_		011 1.0								0		(52)
Tempe	erature fa	actor fro	m Table	2b								0		(53)
٠.			r storage	, kWh/y	ear			(47) x (51) x (52) x (53) = 0						(54)
	(50) or (	, ,	,								0.	75		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (	(55) × (41)	m			i	
(56)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	iv I I	(56)
					m = (56)m								ıx n	(==)
(57)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
	•	,	nnual) fro			(FO)	(50) 00	NE (44)				0		(58)
	•				month ( there is s	•	` '	, ,		r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss cal	culated	for each	month	(61)m =	(60) ÷ 36	1	<u> </u> )m	!	<u>l</u>	<u>Į</u>	Į.		
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
	neat real	uired for	water h	eating c	alculated	for eacl	h month	(62)m =	: 0.85 × (	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	176.26	155.5	163.62	147.12	144.49	129.57	124.88	136.43	136	152.53	160.73	172.17	(-1)	(62)
			-	-	-	_	_	_	_	-	-		ı	

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	
(63)m= 0 0 0 0 0 0 0 0 0 0 0	(63)
Output from water heater	
(64)m= 176.26 155.5 163.62 147.12 144.49 129.57 124.88 136.43 136 152.53 160.73 172.17	
Output from water heater (annual) <sub>112</sub> 1799.31	(64)
Heat gains from water heating, kWh/month 0.25 $'$ [0.85 $\times$ (45)m + (61)m] + 0.8 $\times$ [(46)m + (57)m + (59)m]	
(65)m= 80.39 71.38 76.19 70 69.83 64.16 63.3 67.14 66.3 72.5 74.52 79.03	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating	
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(66)m= 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35 95.35	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 15.08 13.39 10.89 8.24 6.16 5.2 5.62 7.31 9.81 12.45 14.53 15.49	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 166.32 168.05 163.7 154.44 142.75 131.77 124.43 122.7 127.05 136.31 148 158.98	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53 32.53	(69)
Pumps and fans gains (Table 5a)	
(70)m= 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= -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28 -76.28	(71)
Water heating gains (Table 5)	
(72)m= 108.05 106.22 102.4 97.22 93.85 89.12 85.09 90.25 92.08 97.45 103.51 106.22	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$	
(73)m= 344.05 342.26 331.59 314.51 297.37 280.69 269.74 274.86 283.54 300.81 320.64 335.3	(73)
6. Solar gains:	
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.	
Orientation: Access Factor Area Flux g_ FF Gains	
Table 6d m² Table 6a Table 6b Table 6c (W)	
North 0.9x 0.77 x 10.64 x 10.63 x 0.63 x 0.7 = 34.58	(74)
North 0.9x 0.77 x 10.64 x 20.32 x 0.63 x 0.7 = 66.08	(74)
North 0.9x 0.77 x 10.64 x 34.53 x 0.63 x 0.7 = 112.28	(74)
North 0.9x 0.77 x 10.64 x 55.46 x 0.63 x 0.7 = 180.35	(74)
North 0.9x 0.77 x 10.64 x 74.72 x 0.63 x 0.7 = 242.95	(74)
North 0.9x 0.77 x 10.64 x 79.99 x 0.63 x 0.7 = 260.09	(74)
North 0.9x 0.77	(74) (74)
No. of the control of	=
North 0.9x 0.77 × 10.64 × 74.68 × 0.63 × 0.7 = 242.83	(74)

North						_									_
Solar gains in watst, calculated for each month  (83)m = Sum(74)m(82)m  (84)m = Sum(74)m(82)m  (84)m(82)m(82)m  (85)m(82)m(82)m  (85)m(82)m(82)m  (86)m(82)m(82)m  (87)m(82)m(82)m  (88)m(82)m(82)m  (89)m(82)m(82)m  (89)m(82)m(82)m(82)m  (89)m(81)m(82)m(82)m  (89)m(81)m(82)m(82)m  (89)m(81)m(81)m(82)m(82)m  (89)m(81	North 0.9	0.77	X	10.	64	X	1;	3.12	X	0.63	x	0.7	=	42.65	(74)
Same   Sales   66.08   112.28   190.35   242.95   260.09   242.83   192.65   135   78.66   42.85   28.82   (83)   (73)   (73)   (83)   (83)   (84)   (73)   (83)   (84)   (83)   (84)	North 0.9	0.77	X	10.	64	X	8	3.86	X	0.63	X	0.7	=	28.82	(74)
Same   Sales   66.08   112.28   190.35   242.95   260.09   242.83   192.65   135   78.66   42.85   28.82   (83)   (73)   (73)   (83)   (83)   (84)   (73)   (83)   (84)   (83)   (84)															
Total gains — internal and solar (84)m = (73)m + (83)m , watts  9,1m	T		1		ì	1			<u> </u>	<del>- `                                   </del>	· · ·			1	
Second   S	` ′					1			192.65	135	78.66	42.65	28.82		(83)
7. Mean internal temperature (heating season)  Temperature during heating periods in the living area from Table 9, Th1 (°C)  21 [85]  Utilisation factor for gains for living area, h1,m (see Table 9a)  Sept. 1 999 9.98 0.98 0.92 0.77 0.55 0.4 0.46 0.74 0.95 0.99 1 (86)  Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)  87]m. 20.23 20.34 20.53 20.79 20.95 21 21 21 21 20.97 20.77 20.47 20.22 (87)  Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)  88]m. 20.2 20.21 20.21 20.21 20.23 20.23 20.24 20.24 20.25 20.24 20.25 20.24 20.22 20.22 (88)  Which is the sequence of the sequence	Total gains -	- internal a	and solar	(84)m =	= (73)m	+ (8	3)m ,	, watts		_				,	
Temperature during heating periods in the living area from Table 9, Th1 (°C)  Utilisation factor for gains for living area, h1,m (see Table 9a)  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 80m 1 0.99 0.98 0.92 0.77 0.55 0.4 0.46 0.74 0.95 0.99 1 0.666  Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)  Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)  Mean internal temperature in the rest of dwelling from Table 9, Th2 (°C)  Welliam 20 2 3 20 34 20.53 20.79 20.96 21 21 21 21 20.97 20.77 20.47 20.42 20.22 (87)  Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)  Welliam 20 2 20 21 20.21 20.21 20.23 20.22 20.24 20.24 20.24 20.25 20.24 20.23 20.22 20.22 (88)  Welliam internal temperature in the rest of dwelling, h2,m (see Table 9a)  Welliam 1 0.99 0.97 0.9 0.72 0.48 0.33 0.33 0.36 0.67 0.93 0.99 1 (89)  Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)  Welliam 1 0.99 0.97 0.9 0.72 0.48 0.33 0.33 0.38 0.67 0.93 0.99 1 (89)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (90)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (92)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.6 20.38 20.01 19.71 (93)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.6 20.38 20.01 19.71 (93)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.6 20.38 20.01 19.71 (93)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  20/m- 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.8 20.8 20.8 20.01	(84)m= 378.6	3 408.33	443.88	494.86	540.33	540	0.78	512.57	467.51	418.54	379.47	363.3	364.13		(84)
Utilisation factor for gains for living area, h1,m (see Table 9a)    Man   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec	7. Mean int	ernal tem	perature	(heating	seasor	1)									
Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec	Temperatu	re during l	neating p	eriods ir	n the livi	ng a	ırea f	rom Tab	ole 9, Tl	n1 (°C)				21	(85)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)   G88   G92   G95   G9	Utilisation f	actor for g	ains for l	iving are	ea, h1,m	ı (se	e Tal	ble 9a)							_
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)  87/m= 20.23 20.34 20.53 20.79 20.95 21 21 21 20.97 20.77 20.47 20.22 (87)  Temperature during heating periods in rest of dwelling from Table 9, Th2 (*C)  88/m= 20.2 20.21 20.21 20.21 20.23 20.23 20.23 20.24 20.24 20.25 20.24 20.23 20.22 20.22 (88)  Willisation factor for gains for rest of dwelling, h2,m (see Table 9a)  89/m= 1 0.99 0.97 0.9 0.72 0.48 0.33 0.38 0.67 0.93 0.99 1 (69)  Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)  90/m= 19.17 19.33 19.61 19.99 20.18 20.24 20.24 20.24 20.22 19.97 19.54 19.17 (90)  Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  92/m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (92)  Apply adjustment to the mean internal temperature from Table 4e, where appropriate  93/m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (93)  8. Space heating requirement  Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hmGm , W = (94)m x (84)m  95/m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 356.62 362.4 (95)  Monthly average external temperature from Table 8  95/m= 4.3 4.9 6.5 8.9 11.7 14.8 16.6 16.4 14.1 10.6 7.1 4.2 (85)  Heat loss rate for mean internal temperature, Lm , W = (39)m x ((93)m - (96)m)  97/m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98 (97)  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98/m= 284.85 20.85 171.5 71.6 15.94 0 0 0 0 0 8.08.1 187.51 288.36  Follow for mean internal temperature, Lm , W = ((39)m x ((93)m - (95)m) x (41)m  98/m= 284.85 20.85 171.5 71.6 15.94 0 0 0 0 0 8.08.1 187.51 288.36	Jar	Feb	Mar	Apr	May	J	lun	Jul	Aug	Sep	Oct	Nov	Dec		
87)me	(86)m= 1	0.99	0.98	0.92	0.77	0.	.55	0.4	0.46	0.74	0.95	0.99	1		(86)
87)me	Moon inton	and tompo	ratura in	livina or	00 T1 /f	المال	v ctor	oc 2 to 7	in Tah	lo Oc)	!	!	!	J	
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) 88/m= 20.2 20.21 20.21 20.21 20.23 20.23 20.24 20.24 20.25 20.24 20.23 20.22 20.22 (88)  Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) 88/m= 1 0.99 0.97 0.9 0.72 0.48 0.33 0.38 0.67 0.93 0.99 1 (89)  Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) 90/m= 19.17 19.33 19.61 19.99 20.18 20.24 20.24 20.24 20.22 19.97 19.54 19.17 (90) 11.07 19.33 19.61 19.99 20.18 20.24 20.24 20.24 20.22 19.97 19.54 19.17 (90) 11.07 19.34 19.91 (90) 11.07 19.34 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.65 20.38 20.01 19.71 (92) 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.63 20.65 20.38 20.01 19.71 (93) 38. 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 20.37 20.37 0.42 0.7 0.94 0.99 1 (94) 20.91 (94) 20.91 (95) 20.92 20.93 20.92 20.93			1		· `	1	— i		i	<del>'</del>	20.77	20.47	20.22	1	(87)
Wear internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2	(67)111= 20.23	20.34	20.55	20.79	20.93		<u> </u>	21	21	20.97	20.77	20.47	20.22		(01)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)  89)m= 1	Temperatu	re during l	neating p	eriods ir	n rest of	dwe	elling	from Ta	ble 9, 7	h2 (°C)				,	
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	(88)m= 20.2	20.21	20.21	20.23	20.23	20	).24	20.24	20.25	20.24	20.23	20.22	20.22		(88)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	Utilisation f	actor for o	ains for i	rest of d	welling,	h2,r	n (se	e Table	9a)						
99)m= 19.17 19.33 19.61 19.99 20.18 20.24 20.24 20.24 20.22 19.97 19.54 19.17 (90)  ### ftal Eliving area + (4) = 0.51 (91)  Mean internal temperature (for the whole dwelling) = ftal x T1 + (1 - ftal) x T2  ### square s			1			_	<u> </u>			0.67	0.93	0.99	1	]	(89)
99)m= 19.17 19.33 19.61 19.99 20.18 20.24 20.24 20.24 20.22 19.97 19.54 19.17 (90)  ### ftal Eliving area + (4) = 0.51 (91)  Mean internal temperature (for the whole dwelling) = ftal x T1 + (1 - ftal) x T2  ### square s	Moon inton	ad tampa	roturo in	the rest	of dwall	ina -	T2 (fc	ollow etc	no 2 to	7 in Tabl	lo ()o)	<u> </u>	ļ	ı	
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2			1		1	Ť	<u> </u>		·	1	· ·	10.54	10.17	1	(00)
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2  92)m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.6 20.38 20.01 19.71 (92)  Apply adjustment to the mean internal temperature from Table 4e, where appropriate  93)m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (93)  8. Space heating requirement  Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm, W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96)  Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) 1  97)m= 759.26 732.88 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98 (97)  Space heating requirement for each month, kWh/month = 0.024 x ((97)m - (95)m) x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98). ss. v = 1321.42 (98)  Space heating requirements – Individual heating systems including micro-CHP)  Space heating:	(90)m= 19.1	19.33	19.61	19.99	20.18	20	).24	20.24	20.24	<u> </u>	ļ				<b>`</b> `
92)m= 19.71 19.94 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.88 20.01 19.71 (92)  Apply adjustment to the mean internal temperature from Table 4e, where appropriate  93)m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (93)  8. Space heating requirement  Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) 1)  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98)sv = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  29a. Energy requirements - Individual heating systems including micro-CHP)  Space heating:										· ·	ILA = LIVIII	y area - (4	+) =	0.51	(91)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate  93)m= 19.71 19.84 20.08 20.4 20.58 20.62 20.63 20.63 20.6 20.38 20.01 19.71 (93)  8. Space heating requirement  Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm, W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm, W = ((39)m x ((93)m - (96)m)    97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98 (97)  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 0 8.081 187.51 288.36  Total per year (kWh/year) = Sum(98)s = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  2a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Mean inter	nal tempe	rature (fo	r the wh	ole dwe	lling	) = fL	_A × T1	+ (1 – f	LA) × T2					
19.71   19.84   20.08   20.4   20.58   20.62   20.63   20.63   20.6   20.38   20.01   19.71   19.84   20.08   20.4   20.58   20.62   20.63   20.63   20.6   20.38   20.01   19.71   19.71   19.84   20.08   20.4   20.58   20.62   20.63   20.63   20.6   20.38   20.01   19.71   19.71   19.84   20.08   20.4   20.58   20.62   20.63   20.63   20.6   20.38   20.01   19.71   19.71   19.84   20.08   20.01   19.71   19.71   19.84   20.08   20.4   20.63   20.63   20.6   20.38   20.01   19.71	(92)m= 19.7°	19.84	20.08	20.4	20.58	20	).62	20.63	20.63	20.6	20.38	20.01	19.71		(92)
8. Space heating requirement  Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm, W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96)  Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m ]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98 (97)  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98)sa2 = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  3a. Energy requirements - Individual heating systems including micro-CHP)  Space heating:	Apply adjus	stment to t	he mean	interna	l temper	atur	e froi	m Table	4e, wh	ere appr	opriate			•	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98)812 = 1321.42 (98)  Space heating requirements — Individual heating systems including micro-CHP)  Space heating:	(93)m= 19.7°	19.84	20.08	20.4	20.58	20	).62	20.63	20.63	20.6	20.38	20.01	19.71		(93)
the utilisation factor for gains using Table 9a  Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  996)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) 1  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) 1.58-12 1321.42 (98)  93. Energy requirements - Individual heating systems including micro-CHP)  Space heating:	8. Space h	eating req	uirement		•					•	•				
Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec	Set Ti to the	e mean in	ternal ter	nperatu	re obtair	ned a	at ste	p 11 of	Table 9	b, so tha	nt Ti,m=(	76)m an	d re-cald	culate	
Utilisation factor for gains, hm:  94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W = (39)m x (93)m - (96)m ]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>1.3.9.12</sub> = 1321.42 (98)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	the utilisation	on factor f	or gains	using Ta	able 9a									,	
94)m= 0.99 0.99 0.97 0.91 0.74 0.52 0.37 0.42 0.7 0.94 0.99 1  Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m – (96)m ]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98)49.12	Jar	Feb	Mar	Apr	May	J	lun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm , W = (94)m x (84)m  95)m= 376.4  404.04  432.21  449.46  400.59  279.2  187.65  196.1  294.31  356.15  358.62  362.4  Monthly average external temperature from Table 8  96)m= 4.3  4.9  6.5  8.9  11.7  14.6  16.6  16.4  14.1  10.6  7.1  4.2  Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m]	Utilisation f	actor for g	ains, hm	:										,	
95)m= 376.4 404.04 432.21 449.46 400.59 279.2 187.65 196.1 294.31 356.15 358.62 362.4  Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m - (96)m ]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98)1.59.12 = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	(94)m= 0.99	0.99	0.97	0.91	0.74	0.	.52	0.37	0.42	0.7	0.94	0.99	1		(94)
Monthly average external temperature from Table 8  96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m – (96)m]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Useful gain	s, hmGm	W = (94)	4)m x (8	4)m							_	_		
96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2  Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m – (96)m ]  97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	(95)m= 376.4	404.04	432.21	449.46	400.59	27	'9.2	187.65	196.1	294.31	356.15	358.62	362.4		(95)
Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m – (96)m ]  97)m = 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98  Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m  98)m = 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Monthly av	erage exte	ernal tem	perature	e from T	able	8							_	
97)m= 759.26 732.68 662.72 548.91 422.01 280.88 187.8 196.43 305.45 464.77 619.05 749.98 (97)  Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	(96)m= 4.3	4.9	6.5	8.9	11.7	14	4.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m  [98)m = 284.85   220.85   171.5   71.6   15.94   0   0   0   0   80.81   187.51   288.36  Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42   (98)  Space heating requirement in kWh/m²/year   23.03   (99)  Pa. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Heat loss ra	ate for me	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93)n	n- (96)m	]				
98)m= 284.85 220.85 171.5 71.6 15.94 0 0 0 0 80.81 187.51 288.36  Total per year (kWh/year) = Sum(98) <sub>15,912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	(97)m= 759.2	6 732.68	662.72	548.91	422.01	280	0.88	187.8	196.43	305.45	464.77	619.05	749.98		(97)
Total per year (kWh/year) = Sum(98) <sub>15912</sub> = 1321.42 (98)  Space heating requirement in kWh/m²/year 23.03 (99)  Pa. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Space heat	ing requir	ement fo	r each n	nonth, k	Wh/i	mont	h = 0.02	24 x [(97	7)m – (95	j)m] x (4	1)m	•	•	
Space heating requirement in kWh/m²/year  23.03  29a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	(98)m= 284.8	5 220.85	171.5	71.6	15.94		0	0	0	0	80.81	187.51	288.36	]	
Space heating requirement in kWh/m²/year  23.03  29a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:			•				!	ı	Tot	al per year	(kWh/year	r) = Sum(9	8) <sub>15,912</sub> =	1321.42	(98)
9a. Energy requirements – Individual heating systems including micro-CHP)  Space heating:	Space host	ina roquir	omont in	k\\/h/m3	2/voor									00.00	<b>-</b>  (00)
Space heating:	·				•									23.03	(88)
		•	nts – Indi	vidual h	eating s	yste	ms ir	ncluding	micro-	CHP)					
Fraction of space heat from secondary/supplementary system 0 (20°	-	_		_	,										<b>_</b>
	Fraction of	space hea	at from se	econdar	y/supple	emer	ntary	system						0	(201)

Fraction of space heat from main system(s)			(202) = 1 -	(201) =				1	(202)
Fraction of total heating from main system 1			(204) = (20	)2) × [1 –	(203)] =			1	(204)
Efficiency of main space heating system 1								93.5	(206)
Efficiency of secondary/supplementary heating s	system,	%						0	(208)
Jan Feb Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating requirement (calculated above)  284.85   220.85   171.5   71.6   15.94	0	0	0	0	80.81	187.51	288.36		
$(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$	<u> </u>			U	00.01	107.51	200.00		(211)
304.65 236.2 183.42 76.58 17.05	0	0	0	0	86.43	200.55	308.4		(211)
			Total	(kWh/yea	ar) =Sum(2	L 211) <sub>15,1012</sub>	<u> </u>	1413.28	(211)
Space heating fuel (secondary), kWh/month									
= {[(98)m x (201)] } x 100 ÷ (208)								1	
(215)m= 0 0 0 0 0	0	0	0 Total	0 (k\\/\b/\\	0	0 215) <sub>15.1012</sub>	0		7(045)
Water heating			TUlai	(KVVII/yea	ar) =Surri(2	213) <sub>15,1012</sub>	F	0	(215)
Water heating Output from water heater (calculated above)									
, , , , , , , , , , , , , , , , , , , ,	129.57	124.88	136.43	136	152.53	160.73	172.17		
Efficiency of water heater								79.8	(216)
(217)m= 86.09 85.75 84.94 83.01 80.75	79.8	79.8	79.8	79.8	83.21	85.23	86.18		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m									
` '	162.37	156.49	170.96	170.42	183.32	188.6	199.78		
` '									
	<u> </u>			= Sum(2	19a) <sub>112</sub> =	I		2166.83	(219)
Annual totals				= Sum(2		Wh/year		kWh/yea	
Annual totals Space heating fuel used, main system 1	L			= Sum(2		Wh/year		kWh/yeai 1413.28	
Annual totals Space heating fuel used, main system 1 Water heating fuel used				= Sum(2 <sup>-</sup>		Wh/year		kWh/yea	
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot	•			= Sum(2 <sup>-1</sup>		Wh/year		kWh/yeai 1413.28	
Annual totals Space heating fuel used, main system 1 Water heating fuel used				= Sum(2:		Wh/year	30	kWh/yeai 1413.28	
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot				= Sum(2 <sup>-</sup>		Wh/year		kWh/yeai 1413.28	
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump:			Total				30	kWh/yeai 1413.28	(230c)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue			Total		k¹		30	kWh/year 1413.28 2166.83	(230c) (230e)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year	ns includ	ding mi	Total		k¹		30	kWh/year 1413.28 2166.83	(230c) (230e) (231)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting			Total		(230g) =		30 45	kWh/year 1413.28 2166.83 75 266.24	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	Ene		Total		(230g) =	ion fac	30 45	kWh/year 1413.28 2166.83	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	Ene	e <b>rgy</b> n/year	Total		(230g) =	ion fac 2/kWh	30 45	kWh/year 1413.28 2166.83 75 266.24	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system	<b>Ene</b> kWh	e <b>rgy</b> n/year ×	Total		(230g) =  Emiss kg CO	ion fac 2/kWh	30 45 <b>tor</b>	kWh/year 1413.28 2166.83 75 266.24 Emissions kg CO2/ye	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions — Individual heating system Space heating (main system 1)	Ene kWh	ergy n/year x	Total		(230g) =  Emiss kg CO:	<b>ion fac</b> 2/kWh 16	30 45 <b>tor</b>	kWh/year 1413.28 2166.83  75 266.24  Emissions kg CO2/ye 305.27	(230c) (230e) (231) (232) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions — Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kWh (211) (215) (219)	ergy n/year x x	Total	of (230a).	(230g) =  Emiss kg CO:  0.2	<b>ion fac</b> 2/kWh 16	30 45 <b>tor</b> =	kWh/year 1413.28 2166.83  75 266.24  Emissions kg CO2/ye 305.27 0 468.04	(230c) (230e) (231) (232)  (261) (263) (264)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions — Individual heating system Space heating (main system 1) Space heating Space and water heating	Ene kWh (211) (215) (219) (261)	ergy n/year x x x + (262) -	sum d	of (230a).	k(230g) =  Emiss kg CO:  0.2  0.5	<b>ion fac</b> 2/kWh 16	30 45 <b>tor</b> = =	kWh/year 1413.28 2166.83  75 266.24  Emissions kg CO2/ye 305.27 0 468.04  773.31	(230c) (230e) (231) (232)  (261) (263) (264) (265)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions — Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kWh (211) (215) (219)	ergy n/year x x + (262)	sum d	of (230a).	(230g) =  Emiss kg CO:  0.2	ion fac 2/kWh 16 19	30 45 <b>tor</b> =	kWh/year 1413.28 2166.83  75 266.24  Emissions kg CO2/ye 305.27 0 468.04	(230c) (230e) (231) (232)  (261) (263) (264)

Total CO2, kg/year sum of (265)...(271) = 950.41 (272)

TER = 16.56 (273)

### **SAP 2012 Overheating Assessment**

Calculated by Stroma FSAP 2012 program, produced and printed on 07 October 2020

#### Property Details: Unit 3 - COPPETTS WOOD, London

Dwelling type:FlatLocated in:EnglandRegion:Thames valley

Cross ventilation possible:YesNumber of storeys:1Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Low

**Night ventilation:** False

Blinds, curtains, shutters:

**Ventilation rate during hot weather (ach):**4 ( Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient: 201.51 (P1)

Transmission heat loss coefficient: 15.4

Summer heat loss coefficient: 216.9 (P2)

Overhangs:

Orientation: Ratio: Z\_overhangs:

North (Rear Windows) 0 1

Solar shading

Orientation: Z blinds: Solar access: Overhangs: Z summer:

North (Rear Windows) 1 0.9 1 0.9 (P8)

Solar gains:

Orientation FF Area Flux Shading Gains  $g_{-}$ 0.9 308.56 North (Rear Windows) 0.9 x 10.64 81.19 0.63 0.7 **Total** 308.56 (P3/P4)

Internal gains:

June July **August** 394.61 387.48 Internal gains 380.68 728.43 689.24 (P5) Total summer gains 638.36 Summer gain/loss ratio 3.36 3.18 2.94 (P6) Mean summer external temperature (Thames valley) 16 17.9 17.8 Thermal mass temperature increment 1.3 1.3 1.3 (P7) Threshold temperature 20.66 22.38 22.04 Likelihood of high internal temperature Slight Medium Medium

Assessment of likelihood of high internal temperature: Medium