Regulations Compliance Report

Project Informati	on:			
ssessed By:	John Ashe (STRO	D031268)	Building Type:	Flat
Dwelling Details:				
EW DWELLING	DESIGN STAGE		Total Floor Area: 5	3.56m ²
ite Reference :	COPPETTS WOO	OD, London	Plot Reference:	Unit 31 - COPPETTS WOOD
ddress :				
Client Details:				
ame:				
ddress :				
•	rs items included v ete report of regula	vithin the SAP calculations. tions compliance.		
a TER and DE	R			
		gas (c), Mains gas (c)		
	mains gas (c), mains	e (<i>)</i> ,	$16.02 kg/m^{2}$	
-	oxide Emission Rate Dioxide Emission Ra		16.23 kg/m² 8.73 kg/m²	ОК
b TFEE and DI				
	ergy Efficiency (TFE	E)	32.0 kWh/m ²	
welling Fabric E	nergy Efficiency (DF	EE)	26.8 kWh/m ²	
				OK
2 Fabric U-valu		Averege	Highoot	
Element External	-	Average 0.15 (max. 0.30)	Highest 0.15 (max. 0.70)	ОК
Floor	wan	(no floor)	0.10 (max. 0.70)	ÖK
Roof		(no roof)		
Opening		0.90 (max. 2.00)	0.90 (max. 3.30)	ОК
Opening	S			
a Thermal brid	lging			
a Thermal brid? Thermal	lging bridging calculated	using user-specified y-value of	0.15	
a Thermal brid Thermal Air permeabil	lging bridging calculated i ity			
a Thermal brid Thermal Air permeabil Air permea	lging bridging calculated		5.00 (design val	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum	lging bridging calculated i ity bility at 50 pascals			ue) OK
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie	lging bridging calculated i ity bility at 50 pascals ency	using user-specified y-value of	5.00 (design val 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie	lging bridging calculated i ity bility at 50 pascals		5.00 (design val 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie	lging bridging calculated i ity bility at 50 pascals ency	using user-specified y-value of Community heating scheme	5.00 (design val 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie Main Heati	lging bridging calculated i ity bility at 50 pascals ency	using user-specified y-value of Community heating scheme	5.00 (design val 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficid Main Heati Secondary	lging bridging calculated r ity bility at 50 pascals ency ng system: heating system:	using user-specified y-value of Community heating scheme Community boilers	5.00 (design val 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie Main Heati Secondary 5 Cylinder insul	lging bridging calculated i ity ibility at 50 pascals ency ng system: heating system:	using user-specified y-value of Community heating scheme Community boilers None	5.00 (design val 10.0	,
a Thermal brid Thermal Air permeabil Air permea Maximum Heating efficie Main Heati Secondary Secondary Hot water S	lging bridging calculated i ity ibility at 50 pascals ency ng system: heating system:	using user-specified y-value of Community heating scheme Community boilers	5.00 (design val 10.0	,
a Thermal brid Thermal Air permeabil Air permea Maximum Heating efficie Main Heati Secondary Cylinder insu Hot water S	lging bridging calculated i ity ibility at 50 pascals ency ng system: heating system:	using user-specified y-value of Community heating scheme Community boilers None	5.00 (design val 10.0	,
a Thermal brid Thermal Air permeabil Air permea Maximum Heating efficie Main Heati Secondary Cylinder insu Hot water S Controls	lging bridging calculated r ity bility at 50 pascals ency ng system: heating system: lation Storage:	using user-specified y-value of Community heating scheme Community boilers None No cylinder	5.00 (design valu 10.0	,
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie Main Heati 5 Cylinder insu Hot water 5 5 Controls	lging bridging calculated i ity ibility at 50 pascals ency ng system: heating system:	using user-specified y-value of Community heating scheme Community boilers None No cylinder Charging system linked to u	5.00 (design valu 10.0 es - mains gas use of community heating,	OK
2a Thermal brid Thermal 3 Air permeabil Air permea Maximum 4 Heating efficie Main Heati Secondary 5 Cylinder insu Hot water 5 6 Controls	lging bridging calculated i ity ibility at 50 pascals ency ng system: heating system: lation Storage: ting controls	using user-specified y-value of Community heating scheme Community boilers None No cylinder	5.00 (design valu 10.0 es - mains gas use of community heating,	,

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.9	
Maximum	1.5	ОК
MVHR efficiency:	91%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: West	8.95m ²	
Ventilation rate:	4.00	
10 Key features		
Windows U-value	0.9 W/m²K	

Windows U-value Community heating, heat from boilers – mains gas Photovoltaic array 0.9 W/m²K

Thermal Bridge Report

Property Details: Unit 31 - (COPPETTS WOOD, London
Address:	
Located in:	England
Region:	Thames valley
Thermal bridges:	
Thermal bridges:	No information on thermal bridging $(y=0.15)$ $(y=0.15)$



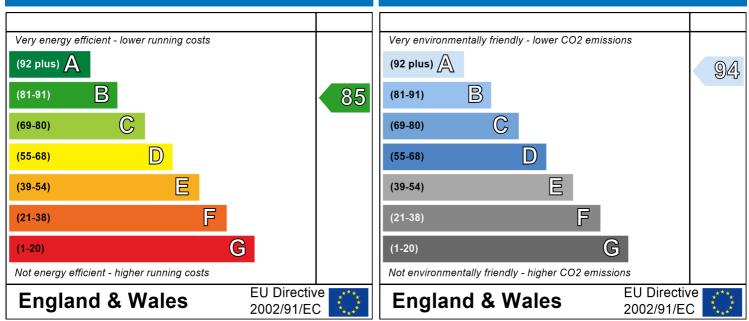
Dwelling type: Date of assessment: Produced by: Total floor area: Mid floor Flat 30 September 2020 John Ashe 53.56 m²

Environmental Impact (CO₂) Rating

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.

Energy Efficiency Rating



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 31 - 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: Detachment:	Flat		
Year Completed:	2020		
Front of dwelling faces:	North		
Comments:			

pe:				
ndows	Frame Factor: 0.7	g-value: 0.63	U-Value: 0.9	Area: 8.95
Average	e or unknown			
n		dows 0.7 Average or unknown		

Opaque Elements:

Type: External Elements	U-Va	lue:	Kappa:
Walls Internal Elements (Area, Kappa)	0.15	Please provide the U-Value calculation to justify the U-Value entered into the assessment.	N/A
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 have been adopted then please provide the associated checklists; signed and dated.

Ventilation: Yes (As designed) Ventilation: Balanced with heat recovery Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True 5 Comments: Please provide the pressure test 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:

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: Comments:	No hot water cylinder
	Solar panel: False
Others:	
Electricity tariff:	Standard Tariff
Low energy lights:	100%
Terrain type: Wind turbine:	Low rise urban / suburban No
Photovoltaics:	Photovoltaic 1
	Installed Peak power: 0.6051744
	Tilt of collector: 30°
	Overshading: None or very little
	Collector Orientation: South
Comments:	

Declaration :

I confirm that the property has been built to the above specification.	
Signed:	

.....

Date:

.....

Assessor Name: John Ashe Stroma Number: STR0031268 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.8 Property Address: Unit 31 - COPPETTS WOOD, London Address : 1. Overall dwelling dimensions: Ground floor $Area(m^2)$ Av. Height(m) Volume(m ³) 53.56 (1a) x 2.66 (2a) = 142.47 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 53.56 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47 (5)$ 2. Ventilation rate: Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of poen flues 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of intermittent fans 0 x 10 = 0 (7c) Number of passive vents 0 x 10 = 0 (7c) Number of flueless gas fires 0 x 40 = 0 (7c) Number of flueless gas fires 0 x 40 = 0 (7c) Hilltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ + $(5) = 0$ (6)			User [Details:						
Address :1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 53.56 $(1a) \times 2.66$ $(2a) = 142.47$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 53.56 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47$ (5) Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47 (5) Number of chimneys 0 $+$ 0 $+$ 0 $+$ 0 $+$ 0 $ -$ <th col<="" th=""><th></th><th></th><th></th><th>Software Ver</th><th>rsion:</th><th></th><th>Versio</th><th>n: 1.0.5.8</th><th></th></th>	<th></th> <th></th> <th></th> <th>Software Ver</th> <th>rsion:</th> <th></th> <th>Versio</th> <th>n: 1.0.5.8</th> <th></th>				Software Ver	rsion:		Versio	n: 1.0.5.8	
A constrained welling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 53.56 $(1a) \times 2.66$ $(2a) =$ 142.47 $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 53.56 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 142.47 (5) Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47 (5) C. Ventilation rate:Number of chimneys 0 $+$ 0 $x40 =$ 0 $(6a)$ Number of open flues 0 $x = 0$ $x = 0$ $(6a)$ Number of intermittent fans 0 $x = 0$ $(6b)$ Number of flueless gas fires 0 $x = 0$ $(6b)$ Number of flueless gas fires 0 $x = 0$ $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $x = 0$ (a) Number of flueless gas fires 0 $x = 0$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $x = (5) =$ 0			Property	Address: Unit 31	- COPPE	TTS W	/00D, L	ondon		
Area(m²) Ground floorAv. Height(m) 53.56 Volume(m³) 142.47 Ground floor 53.56 $(1a) \times 2.66$ $(2a) = 142.47$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 53.56 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47$ (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47$ (5) CVentilation rate:Number of chimneys0 $+$ 0 e 0 $x40 = 0$ $(6a)$ Number of open flues 0 $+$ 0 $=$ 0 $x40 = 0$ $(6b)$ Number of intermittent fans 0 $x10 = 0$ $(7a)$ Number of flueless gas fires 0 $x40 = 0$ $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $+$ 0 $+$ 0 $+$ 0 $ 0$ $(5) = 0$ (8)										
Ground floor 53.56 $(1a) \times 2.66$ $(2a) = 142.47$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 53.56 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47$ (5) 2. Ventilation rate: $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 142.47$ (5) Number of chimneys $0 + 0$ 0 $e^{0} 0$ $(6a)$ Number of open flues $0 + 0$ $+ 0$ $= 0$ $x 40 = 0$ $(6a)$ Number of intermittent fans $0 + 10 = 0$ $x 10 = 0$ $(7a)$ Number of flueless gas fires $0 \times x 10 = 0$ $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $+ (5) = 0$ (8)	1. Overall dwelling dimer	ISIONS:	•	())						
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 142.47 (5)2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hourNumber of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $x20 =$ 0 (6b)Number of intermittent fans 0 $x10 =$ 0 $(7a)$ Number of passive vents 0 $x10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (6) = 0 (8)	Ground floor		r			. ,	(2a) =		-	
2. Ventilation rate:Number of chimneys \bigcirc secondary heatingothertotalm³ per hour heatingNumber of open flues \bigcirc \bigcirc $+$ \bigcirc $=$ \bigcirc $\times 40 =$ \bigcirc (6a)Number of open flues \bigcirc $+$ \bigcirc $=$ \bigcirc $\times 20 =$ \bigcirc (6b)Number of intermittent fans \bigcirc $\times 10 =$ \bigcirc $(7a)$ Number of passive vents \bigcirc $\times 10 =$ \bigcirc $(7b)$ Number of flueless gas fires \bigcirc $\times 40 =$ \bigcirc $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ \bigcirc \div (5) = \bigcirc (8)	Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	53.56 (4)						
main heatingsecondary heatingothertotal m^3 per hourNumber of chimneys 0 $+$ 0 $=$ 0 $\times 40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $\times 20 =$ 0 (6b)Number of intermittent fans 0 $+$ 0 $=$ 0 $\times 10 =$ 0 (7a)Number of passive vents 0 $\times 10 =$ 0 (7b) 0 $\times 40 =$ 0 (7c)Number of flueless gas fires 0 $\times 40 =$ 0 (7c) Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8)	Dwelling volume			(3a)+(3b)+(3c)+(3d)+	(3e)+	.(3n) =	142.47	(5)	
heatingheatingheatingNumber of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $x 40 =$ 0 $(6a)$ Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $x 20 =$ 0 $(6b)$ Number of intermittent fans 0 $x 10 =$ 0 $(7a)$ Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8)	2. Ventilation rate:									
Number of intermittent fans 0 $x 10 =$ 0 $(7a)$ Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $\div (5) =$ 0 (8)	-	heating	heating					-	-	
Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8)	Number of open flues	0 +	0 +	0 =	0	x 2	20 =	0	(6b)	
Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $\div (5) =$ 0 (8)	Number of intermittent fan	S			0	x 1	0 =	0	(7a)	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (8)	Number of passive vents			Г	0	x 1	0 =	0	(7b)	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) = 0$ \div (5) = 0 (8)	Number of flueless gas fire	es			0	x 4	40 =	0	(7c)	
							Air ch	anges per hou	ur	
It a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)	•				-		÷ (5) =	0	(8)	
Number of storeys in the dwelling (ns)			ed, proceed to (17),	otherwise continue fr	rom (9) to (16	5)		0		
Number of storeys in the dwelling (ns)0Additional infiltration $[(9)-1]x0.1 =$ 0(10)	•					[(9)-	-11x0.1 =		-	
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		25 for steel or timber	frame or 0.35 fo	r masonry constr	ruction	L(-)				
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 both types of wall are pre deducting areas of opening	esent, use the value corres gs); if equal user 0.35	sponding to the grea	ter wall area (after					_``´	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	-		led) or 0.1 (seal	ed), else enter 0				0	(12)	
If no draught lobby, enter 0.05, else enter 0	• •							0		
Percentage of windows and doors draught stripped 0 (14)	U U	and doors draught s	tripped	0.05 [0.0 × (1.4) + 1	001					
Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0(15)Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0(16)					-	15) -			=	
		50 overessed in cul	nia matras par b				aroa		4	
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.25 (18)						velope	alea		=	
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	•	•			is being use	d		0.23		
Number of sides sheltered 0 (19)					-			0	(19)	
Shelter factor $(20) = 1 - [0.075 \times (19)] = 1$ (20)	Shelter factor			(20) = 1 - [0.075 x (1	19)] =			1	(20)	
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.25$ (21)	Infiltration rate incorporation	ng shelter factor		(21) = (18) x (20) =				0.25	(21)	
Infiltration rate modified for monthly wind speed	Infiltration rate modified fo	r monthly wind spee	d							
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb I	Mar Apr May	Jun Jul	Aug Sep	Oct	Nov	Dec			
Monthly average wind speed from Table 7	Monthly average wind spe	ed from Table 7		·	,					
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	(22)m= 5.1 5	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	Wind Factor (22a)m = (22)m ÷ 4								
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	(22a)m= 1.27 1.25 1	.23 1.1 1.08	0.95 0.95	0.92 1	1.08	1.12	1.18			

Adjust	ed infiltr	ation rat	e (allowi	ing for sł	nelter an	d wind s	peed) =	(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		
			•	rate for t	he appli	cable ca	se	•		•	•			<u> </u>
		al ventila											0.5	(23a)
lf exh	aust air h	eat pump	using App	endix N, (2	:3b) = (23a	i) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23b)
If bala	anced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				77.35	(23c)
a) If	balance	d mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 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	balance	ed mecha	anical ve	entilation	without	heat rec	covery (N	MV) (24b)m = (22	2b)m + (2	23b)		-	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	ntilation of	or positiv	e input v	ventilatio	on from o	outside	•	•			
i	if (22b)n	n < 0.5 ×	(23b), t	then (24	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	n or wh	lole hous	e positiv	e input	ventilatio	on from I	oft			<u>.</u>	1	
í	if (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			_	
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)		-	-		
(25)m=	0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(25)
0.11.			at lana									•	1	
				paramet										
ELEN	IENT	Gros area	-	Openin rr		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·l		A X k kJ/K
Windo	ws		()			8.95		/[1/(0.9)+		7.78				(27)
Walls											╡,			
		27.4		8.95)	18.48		0.15	=	2.77				(29)
		elements				27.43								(31)
				effective wi nternal wal			ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	
		s, W/K :				niono		(26)(30)) + (32) =				10.55	(33)
		Cm = S(0)						(30) + (32	(32a)	(32e) -		(34)
				7 – Cm		l / m 2 l /				tive Value	, , , ,	(020) –	1108.8	
		•		P = Cm +	,			racioaly the				obla 1f	100	(35)
	-	ad of a de			constructi	Un ale nui	i known pr	recisely the	e indicative	values of				
Therm	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix I	<						4.11	(36)
	-			nown (36) =		-								
Total fa	abric he	at loss							(33) +	(36) =			14.66	(37)
Ventila	tion hea	at loss ca	alculated	d monthly	y				(38)m	= 0.33 × (25)m x (5))		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.31	20.02	19.72	18.25	17.96	16.49	16.49	16.2	17.08	17.96	18.55	19.14		(38)
Hoot tr		coefficier	1 ht::\\\//k						(30)m	= (37) + (3	38)m		1	
(39)m=	34.97	34.68	34.38	32.92	32.62	31.15	31.15	30.86	31.74	32.62	33.21	33.8	1	
(39)11=	54.97	34.00	54.50	52.92	32.02	31.15	31.13	30.80		Average =		I	32.84	(39)
Heat lo	oss para	meter (H	HLP), W	/m²K						= (39)m ÷		12 / 12-	52.04	
(40)m=	0.65	0.65	0.64	0.61	0.61	0.58	0.58	0.58	0.59	0.61	0.62	0.63		
-	L			I				I		Average =	Sum(40)1	12 /12=	0.61	(40)
Numbe	er of day	/s in moi	nth (Tab	le 1a)				<u> </u>						
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
	I													
4. Wate	r heati	ng enei	rgy requi	rement:								kWh/ye	ear:	
Assumed		ancy I	N									.8		(42)
if TFA	> 13.9	, N = 1	+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		.0		(42)
if TFA			tor upor	no in litro	o por de	w Vd ov	orogo –	(25 v NI)	1.26				I	(40)
Annual a										se target o		.83		(43)
not more th	nat 125 li	itres per p	person per	ˈday (all w	ater use, l	not and co	ld)				-	-		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water u	isage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					1	
(44)m= 8	34.52	81.44	78.37	75.3	72.22	69.15	69.15	72.22	75.3	78.37	81.44	84.52		
Energy con	ntent of h	not water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D)))))))))))))))))))		Total = Su hth (see Ta	· · ·		921.99	(44)
(45)m= 1	25.33	109.62	113.12	98.62	94.63	81.66	75.67	86.83	87.86	102.4	111.77	121.38		
	I							I	-	Fotal = Su	m(45) ₁₁₂ =	=	1208.88	(45)
lf instantan	eous wa	ter heatii	ng at point	of use (no	hot water	[.] storage),	enter 0 in	boxes (46) to (61)					—
· · ·	18.8	16.44	16.97	14.79	14.19	12.25	11.35	13.02	13.18	15.36	16.77	18.21		(46)
Water sto Storage v	-		includin	a anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	l	(47)
lf commu		. ,					-					0		()
Otherwis	•	-			-			• •	ers) ente	er '0' in (47)			
Water sto	-													
a) If mar					or is kno	wn (kWł	n/day):					0		(48)
Tempera												0		(49)
Energy lo b) If mar			-			or is not		(48) x (49)) =		1	10		(50)
Hot wate				•							0.	02		(51)
If commu	unity he	eating s	ee sectio	on 4.3										
Volume f											1.	03		(52)
Tempera											0	.6		(53)
Energy lo			-	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
Enter (50 Water sto	, ,	, ,		or oach	month			((56)m - (55) × (41)ı	~	1.	03		(55)
_					1	20.00					20.00	22.04		(56)
(56)m= 3 If cylinder c	32.01 contains	28.92 dedicate	32.01 d solar sto	30.98 rage, (57)ı	32.01 n = (56)m	30.98 x [(50) – (32.01 H11)] ÷ (5	32.01 0), else (5	30.98 7)m = (56)	32.01 m where (30.98 H11) is fro	32.01 m Append	lix H	(30)
· –	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)
						00.00	02.01	02.01	00.00	02.01				
Primary of Primary of		•				50)m - ((58) · 36	5 🗸 (11)	m			0		(58)
•			rom Tabl		,	,	. ,	• • •		r thermo	stat)			
· –	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)
ـــا Combi lo		rulated	for each	month ((61)m –	(60) <u>-</u> 36	1 35 x (41))m			1			
(61)m=				0	01)11 =	00) - 30		0	0	0	0	0		(61)
													l (59)m + (61)m	
	80.61	159.55	168.39	152.11	149.9	135.15	130.94	142.1	141.36	157.67	165.27	176.66		(62)
	L		I				I	1	1		I	I	I	-

Solar DHW input	calculated	using App	endix G o	r Appendix	: H (ne	gative quantit	y) (en	ter '0'	if no solar	contrib	ution to wate	er heati	ng)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	app	ies, see Ap	pend	dix G	G)			_			
(63)m= 0	0	0	0	0	0	0	0)	0	0	0	0			(63)
Output from v	vater hea	ter		-	_							-			
<mark>(64)m=</mark> 180.61	159.55	168.39	152.11	149.9	135	15 130.94	142	2.1	141.36	157.67	165.27	176.6	6		_
								Outp	out from wa	ter heat	er (annual)	12		1859.72	(64)
Heat gains fro	om water	heating,	kWh/m	onth 0.2	5 ´ [O	.85 × (45)m	n + (6	61)m	ı] + 0.8 x	[(46)n	n + (57)m	+ (59)m]	
(65)m= 85.9	76.39	81.83	75.59	75.68	69.	69.38	73.	.09	72.01	78.27	79.96	84.5	8		(65)
include (57)m in calo	culation	of (65)m	only if c	ylind	er is in the	dwel	ling	or hot wa	ater is	from com	munit	y h	eating	
5. Internal g	jains (see	e Table 5	5 and 5a):											
Metabolic gai	ns (Table	5), Wat	ts												
Jan	Feb	Mar	Apr	May	Ju	n Jul	A	ug	Sep	Oct	Nov	De	с		
(66)m= 107.7	107.7	107.7	107.7	107.7	107	.7 107.7	107	7.7	107.7	107.7	107.7	107.	7		(66)
Lighting gains	s (calcula	ted in Ap	opendix	L, equat	ion L	9 or L9a), a	also s	see 7	Table 5			-			
(67)m= 36.08	32.05	26.06	19.73	14.75	12.	13.45	17.	.49	23.47	29.8	34.79	37.0	8		(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uatio	n L13 or L1	3a),	also	see Tab	ole 5		-			
(68)m= 233.53	235.96	229.85	216.85	200.44	185	01 174.71	172	2.29	178.39	191.39	207.81	223.2	23		(68)
Cooking gain	s (calcula	ted in A	ppendix	L, equat	tion L	15 or L15a), als	so se	e Table	5	•	•			
(69)m= 47.57	47.57	47.57	47.57	47.57	47.	67 47.57	47.	.57	47.57	47.57	47.57	47.5	7		(69)
Pumps and fa	ans gains	(Table 5	5a)					!	I						
(70)m= 0	0	0	0	0	0	0)	0	0	0	0			(70)
Losses e.g. e	vaporatio	n (nega	tive valu	es) (Tab	le 5)										
(71)m= -71.8	-71.8	-71.8	-71.8	-71.8	, -71	.8 -71.8	-71	1.8	-71.8	-71.8	-71.8	-71.8	в		(71)
Water heating	a dains (T	able 5)		1											
(72)m= 115.45		109.99	104.98	101.73	97.	5 93.25	98.	.24	100.01	105.2	111.06	113.6	88		(72)
Total interna	l gains =		ļ	I		(66)m + (67)r	n + (68	8)m +	- (69)m + (70)m +	(71)m + (72))m			
(73)m= 468.53			425.03	400.38	378	08 364.88	371	.48	385.35	409.86	437.11	457.4	16		(73)
6. Solar gair											l	1			
Solar gains are		using sola	r flux from	Table 6a	and a	sociated equa	ations	to co	nvert to the	e applic	able orientat	tion.			
Orientation:	Access F	actor	Area			Flux			g_		FF			Gains	
	Table 6d		m²			Table 6a		Т	able 6b		Table 6c			(W)	
West 0.9x	0.77	x	8.9	95	x	19.64	x		0.63	x	0.7		= [53.72	(80)
West 0.9x	0.77	x	8.9	95	×	38.42	x		0.63	x	0.7		= [105.09	(80)
West 0.9x	0.77	x	8.9	95	×	63.27	x		0.63	x	0.7		= [173.07	(80)
West 0.9x	0.77	x	8.9	95	хГ	92.28	x		0.63	×	0.7		= [252.41	(80)
West 0.9x	0.77	x	8.9	95	×	113.09] x		0.63	×	0.7		= [309.34	(80)
West 0.9x	0.77	x	8.9	95	×	115.77] ×		0.63	×	0.7		= [316.66	(80)
West 0.9x	0.77	x	8.9	95	×Г	110.22] x		0.63	×	0.7		= [301.47	(80)
West 0.9x	0.77	x	8.9	95	×	94.68	x		0.63	- x	0.7		= [258.96	(80)
West 0.9x	0.77	x	8.9	95	×	73.59] x		0.63	×	0.7		= [201.28	(80)
West 0.9x		x			×Г	45.59] x	<u> </u>	0.63	- x	0.7		= [124.7	(80)
							L .			I			L		

West $0.9x$ 0.77 x 8.95 x 24.49 x 0.63 x 0.7 = 66.98 (8 West $0.9x$ 0.77 x 8.95 x 16.15 x 0.63 x 0.7 = 66.98 (8 Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m $(82)m$ $(82)m$ $(82)m$	•)
	0)
Solar going in watte coloulated for each month (22) (22) (22)	0)
Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$	
(83)m= 53.72 105.09 173.07 252.41 309.34 316.66 301.47 258.96 201.28 124.7 66.98 44.18 (8	3)
Total gains – internal and solar (84)m = (73)m + (83)m , watts	
(84)m= 522.25 570.23 622.44 677.43 709.72 694.74 666.36 630.44 586.63 534.56 504.1 501.64 (8)	4)
7. Mean internal temperature (heating season)	
Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (8	5)
Utilisation factor for gains for living area, h1,m (see Table 9a)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(86)m= 0.84 0.79 0.7 0.56 0.42 0.29 0.21 0.22 0.37 0.59 0.76 0.84 (8	6)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)	
(87)m= 20.4 20.55 20.74 20.91 20.98 21 21 21 20.99 20.91 20.69 20.41 (8	7)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)	
(88)m= 20.38 20.39 20.39 20.42 20.42 20.45 20.45 20.45 20.44 20.42 20.41 20.4 (8	8)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	
(89)m= 0.82 0.77 0.68 0.53 0.39 0.26 0.18 0.2 0.34 0.57 0.74 0.83 (8	9)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	
(90)m= 19.6 19.81 20.07 20.31 20.4 20.44 20.45 20.45 20.43 20.32 20.01 19.62 (9	0)
$fLA = Living area \div (4) = 0.46$ (9)	
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$ (92)m= 19.97 20.15 20.38 20.59 20.67 20.7 20.7 20.71 20.69 20.59 20.32 19.99 (9	2)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate	_,
(93)m= 19.97 20.15 20.38 20.59 20.67 20.7 20.7 20.7 20.71 20.69 20.59 20.32 19.99 (9	3)
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= 0.81 0.76 0.68 0.54 0.41 0.27 0.19 0.21 0.35 0.57 0.74 0.82 (9	4)
Useful gains, hmGm , W = (94) m x (84) m	.,
(95)m= 424.01 435.32 422.69 366.6 287.62 189.42 127.7 132.7 207.19 307.15 373.5 411.95 (9	5)
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 (9	6)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]	
(97)m= 548.02 528.98 477.3 384.86 292.46 190.03 127.81 132.85 209.11 325.94 439.14 533.6 (9	7)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m	
(98)m= 92.27 62.94 40.63 13.14 3.6 0 0 0 0 13.98 47.26 90.51	
Total per year (kWh/year) = $Sum(98)_{15,912}$ = 364.32 (9	8)
Space heating requirement in kWh/m²/year 6.8 (9	9)

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

Space heating from CHP	(307a) x	4.24 x 0.01 =	6.49	(340a)
10b. Fuel costs – Community heating sch	eme Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Electricity generated by wind turbine (Appe			0	(334)
Electricity generated by PVs (Appendix M)			-522.64	(333)
Energy for lighting (calculated in Appendix			254.88	(332)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	195.54	(331)
pump for solar water heating			0	(330g)
warm air heating system fans			0	(330b)
Electricity for pumps and fans within dwellin mechanical ventilation - balanced, extract of	e (2	195.54	(330a)
Space cooling (if there is a fixed cooling sy	stem, if not enter 0)	= (107) ÷ (314) =	0	(315)
Cooling System Energy Efficiency Ratio			0	(314)
Electricity used for heat distribution	0.0	1 × [(307a)(307e) + (310a)(310e)] =	18.68	(313)
Water heat from heat source 2		(64) x (303b) x (305) x (306) =	781.08	(310b)
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x (305) x (306) =	781.08	(310a)
Water heating Annual water heating requirement			1859.72]
Space heating requirement from secondary	/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Efficiency of secondary/supplementary hea	ating system in % (from Tab	e 4a or Appendix E)	0	(308
Space heat from heat source 2		(98) x (304b) x (305) x (306) =	153.02	(307b)
Space heat from Community boilers		(98) x (304a) x (305) x (306) =	153.02	(307a)
Space heating Annual space heating requirement			kWh/year 364.32]
Distribution loss factor (Table 12c) for com	munity heating system		1.05	(306)
Factor for control and charging method (Ta	ble 4c(3)) for community he	ating system	1	(305)
Fraction of total space heat from communit	y heat source 2	(302) x (303b) =	0.4	(304b)
Fraction of total space heat from Communi	ty boilers	(302) x (303a) =	0.4	(304a)
Fraction of community heat from heat sour	ce 2		0.4	(303b)
The community scheme may obtain heat from severa includes boilers, heat pumps, geothermal and waste l Fraction of heat from Community boilers			he latter 0.4	(303a)
Fraction of space heat from community sys	stem 1 – (301) =		1	(302)
Fraction of space heat from secondary/sup	plementary heating (Table	11) '0' if none	0	(301)

(307b) x

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Space heating from heat source 2

6.49

(340b)

x 0.01 =

4.24

Water heating from CHP	(310a) x		4.24 × 0.01 =	-	33.12	(342a)
Water heating from heat source 2	(310b) x		4.24 × 0.01 =	=	33.12	(342b)
		Fu	uel Price			_
Pumps and fans	(331)		13.19 × 0.01 =	=	25.79	(349)
Energy for lighting	(332)		13.19 × 0.01 =	=	33.62	(350)
Additional standing charges (Table 12)					120	(351)
Energy saving/generation technologies Total energy cost	= (340a)(342e) + (345)((354) =			258.62	(355)
11b. SAP rating - Community heating	scheme					
Energy cost deflator (Table 12)					0.42	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0]	=			1.1	(357)
SAP rating (section12)					84.63	(358)
12b. CO2 Emissions – Community hea	ting scheme	_				
		Energy kWh/year	Emission factor kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and v	water heating (not CHP)	-	U	U	-	
Efficiency of heat source 1 (%)		g two fuels repeat (363)	to (366) for the second fu	uel	89	(367a)
Efficiency of heat source 2 (%)	If there is CHP usin	g two fuels repeat (363)	to (366) for the second fu	uel	89	(367b)
CO2 associated with heat source 1	[(307b)+	-(310b)] x 100 ÷ (367b) x	0.22	= [226.7	(367)
CO2 associated with heat source 2	[(307b)+	-(310b)] x 100 ÷ (367b) x	0.22	= [226.7	(368)
Electrical energy for heat distribution		[(313) x	0.52	= [9.7	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(3	372)	= [463.1	(373)
CO2 associated with space heating (se	condary)	(309) x	0	= [0	(374)
CO2 associated with water from immer	sion heater or instantane	eous heater (312) x	0.22	= [0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =		[463.1	(376)
CO2 associated with electricity for pum	ps and fans within dwell	ing (331)) x	0.52	= [101.49	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	= [132.28	(379)
Energy saving/generation technologies	(333) to (334) as applic	able	0.52 x 0.01 =			
	ours of (276) (282)	L	0.52		-271.25	(380)
Total CO2, kg/year	sum of (376)(382) = (383) ÷ (4) =				425.62	(383)
Dwelling CO2 Emission Rate El rating (section 14)	(000) : (+) =				7.95	(384) (385)
13b. Primary Energy – Community hea	ting scheme				94.21	
Tob. T finary Energy Commany field		Energy kWh/year	Primary factor		Energy Vh/year	
Energy from other sources of space an Efficiency of heat source 1 (%)			to (366) for the second fu	uel	89	(367a)
Efficiency of heat source 2 (%)	If there is CHP usin	g two fuels repeat (363)	to (366) for the second fu	uel	89	(367b)

Total Primary Energy, kWh/year su	im of (376)(382) =			2396.52	(383)
Energy saving/generation technologies Item 1	[3.07 × 0	.01 =	-1604.51	(380)
Energy associated with electricity for lighting	(332))) x	3.07	=	782.47	(379)
Energy associated with electricity for pumps and fans	within dwelling (331)) x 3.07	=	600.31	(378)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Total Energy associated with space and water heating	(373) + (374) + (375) =	=		2618.25	(376)
Energy associated with water from immersion heater of	or instantaneous heater(312)	x 1.22	=	0	(375)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
if it is negative set (373) to zero (unless specified ot	herwise, see C7 in Append	ix C)		2618.25	(373)
Total Energy associated with community systems	(363)(366) + (368)	.(372)	=	2618.25	(373)
Electrical energy for heat distribution	[(313) x		=	57.35	(372)
Energy associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b)	x 1.22	=	1280.45	(368)
Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b)	x 1.22	=	1280.45	(367)

		User I	Details:						
Assessor Name:	John Ashe		Strom					031268	
Software Name:	Stroma FSAP 201		Softwa					n: 1.0.5.8	
		Property	Address:	: Unit 31	- COPF	PETTS W	/OOD, L	ondon	
Address :	vociono:								
1. Overall dwelling dime	ensions.	٨٣٥	a(m²)			ight(m)		Volume(m ³)	
Ground floor			. ,	(1a) x		.66	(2a) =	142.47	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	53.56	(4)	L		-		_
Dwelling volume				(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	142.47	(5)
2. Ventilation rate:									
		condary	other		total			m ³ per hour	
Number of chimneys	heating h	eating 0 +	0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0 +	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				2	x ^	10 =	20	(7a)
Number of passive vents					0	x ′	10 =	0	(7b)
Number of flueless gas fi	res				0	x 4	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	vs. flues and fans = (63)	a)+(6b)+(7a)+(7b)+	(7c) =	Г	20	<u> </u>	÷ (5) =	0.14	(8)
If a pressurisation test has b				continue fro	-		. (0)	0.14	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0				•	uction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresp nas): if equal user 0.35	oonding to the grea	ter wall are	a (after					
If suspended wooden t		ed) or 0.1 (seal	ed), else	enter 0				0	(12)
lf no draught lobby, en	ter 0.05, else enter 0							0	(13)
Percentage of window	s and doors draught st	ripped						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	• • •	•	•	•	etre of e	nvelope	area	5	(17)
If based on air permeabil								0.39	(18)
Air permeability value applie		been done or a de	gree air pei	rmeability i	is being u	sed		_	
Number of sides sheltere Shelter factor			(20) = 1 -	[0.075 x (1	9)] =			0	(19) (20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)		/-			0.39	(21)
Infiltration rate modified f	-							0.05	_()
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7	·							
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 1	•							
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		
	II	<u> </u>						I	

Adjust	ed infiltr	ation rat	e (allow	ing for sl	nelter an	d wind s	peed) =	(21a) x	(22a)m				_		
	0.5	0.49	0.48	0.43	0.42	0.37	0.37	0.36	0.39	0.42	0.44	0.46			
			-	rate for t	he appli	cable ca	se	-	•	-	-	-			٦
		al ventila				/							0		(23a)
								N5)) , othe) = (23a)			0		(23b)
If bala	anced with	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				0		(23c)
a) If	balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]		
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24a)
b) If	balance	ed mech	anical ve	entilation	without	heat rec	overy (N	MV) (24b	o)m = (22	2b)m + (2	23b)				
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
c) If	whole h	Iouse ex	tract ver	ntilation of	or positiv	ve input v	ventilatio	on from o	outside	•	•				
i	if (22b)r	n < 0.5 >	< (23b) , t	then (24	c) = (23b); other	wise (24	c) = (22b	o) m + 0.	5 × (23b)				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
d) If	natural	ventilatio	on or wh	ole hous	se positiv	/e input	ventilatio	on from l	oft	•	•	-			
í	if (22b)r	n = 1, th	en (24d)	m = (22	b)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]					
(24d)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(24d)
Effe	ctive air	change	rate - er	nter (24a	i) or (24t	o) or (24	c) or (24	d) in boy	x (25)			-	-		
(25)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(25)
0.11.	at la sa s				•		•	•	•	•	•	•			
		s and he							_	A \/ 11					
ELEN	/IEN I	Gros area		Openir m	igs 1²	Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·l		A X kJ/ł	
Windo	ws		(,		-	8.95		/[1/(1.4)+		11.87			-		(27)
Walls					.]				I		= ,				-
		27.4		8.95)	18.48		0.18	=	3.33					(29)
		elements				27.43									(31)
					ndow U-va Is and part		ated using	g formula 1	/[(1/U-valu	ie)+0.04] â	as given in	paragraph	1 3.2		
		ss, W/K			io ana pan			(26)(30)) + (32) =				15.1		(33)
		Cm = S(0)				. , . ,	((28)	(30) + (32	(32a)	(32e) -	1108		(34)
			. ,	2 – Cm	÷ TFA) ir	k l/m2k				tive Value		(020) =			4
		•			,			recisely the				abla 1f	250) 	(35)
	-	ad of a de			construct		i known pi	censery inc		, values of					
Therm	al bridg	es : S (L	x Y) cal	culated	using Ap	pendix I	<						1.3	7	(36)
if details	of therma	al bridging	are not kr	nown (36) :	= 0.05 x (3	1)									
Total fa	abric he	at loss							(33) +	(36) =			16.5	6	(37)
Ventila	tion hea	at loss ca	alculated	d monthl	у				(38)m	= 0.33 × (25)m x (5))			_
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(38)m=	29.33	29.11	28.88	27.84	27.65	26.74	26.74	26.57	27.09	27.65	28.04	28.45			(38)
Heat tr	ansfer (coefficie	nt W/K	•				•	(39)m	= (37) + (3	38)m	-			
(39)m=	45.89	45.67	45.45	44.41	44.21	43.3	43.3	43.14	43.65	44.21	44.6	45.02			
(00)	10100									Average =		I	44.4	4	(39)
Heat lo	oss para	ameter (H	HLP), W	/m²K						= (39)m ÷					
(40)m=	0.86	0.85	0.85	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84			
		<u>.</u>	<u>.</u>	<u>.</u>				<u>.</u>	•	Average =	Sum(40)1	₁₂ /12=	0.8	3	(40)
Numbe	er of day	ys in mo	nth (Tab	le 1a)										_	-
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
		1	1	1										
4. Wa	iter hea	ting ene	rav reau	irement:								kWh/ye	ear:	
													1	
if TF				: [1 - exp	(-0.0003	849 x (TF	FA -13.9))2)] + 0.(0013 x (⁻	TFA -13.		.8		(42)
Annua	l averag	je hot wa			es per da							6.83		(43)
		-		• •	5% if the a vater use, l	-	-	o achieve	a water us	se target o	f			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)	-	-		-		
(44)m=	84.52	81.44	78.37	75.3	72.22	69.15	69.15	72.22	75.3	78.37	81.44	84.52		-
Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x D) Tm / 3600		Total = Su hth (see Ta			921.99	(44)
(45)m=	125.33	109.62	113.12	98.62	94.63	81.66	75.67	86.83	87.86	102.4	111.77	121.38		
(10)	0.00			00.02	0.000	0.100	10101	00.00		Total = Su			1208.88	(45)
lf instant	taneous v	vater heati	ng at point	t of use (no	o hot water	[.] storage),	enter 0 in	boxes (46						_
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage		includir		olar or W	///HBC	storada	within sa	me ves	ما		450		(47)
-		. ,			velling, e		-			501		150		(47)
	•	-			ncludes i			. ,	ers) ente	er '0' in (47)			
	storage			(,		,			
a) If m	anufact	urer's de	eclared I	oss fact	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
•••			-	e, kWh/y				(48) x (49)) =			0		(50)
,				•	loss fact le 2 (kWl							0		(51)
		•	ee secti			.,	.,,					0		(0.)
Volum	e factor	from Ta	ble 2a									0		(52)
Tempe	erature f	actor fro	m Table	2b								0		(53)
•••			-	e, kWh/y	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	(54) in (5										0		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m	-			
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contain:	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
	•				month (. ,	. ,						
		· · · · · ·	r	r	here is s		1		· ·	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) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	106.53	93.18	96.15	83.82	80.43	69.41	64.32	73.8	74.68	87.04	95.01	103.17		(62)

Solar DHW input	t calculated	using Ap	pendix G c	r Appendi	хH	(negati	ve quantity	/) (en	er '0'	if no solar	contrib	ution to wate	er hea	ting)		
(add addition	al lines if	FGHRS	and/or	WWHR	S ap	plies	see Ap	pend	dix G	G)			_			
(63)m= 0	0	0	0	0		0	0	C)	0	0	0	()		(63)
Output from v	water hea	iter													_	
(64)m= 106.53	93.18	96.15	83.82	80.43	6	69.41	64.32	73	.8	74.68	87.04	95.01	103	8.17		_
									Outp	out from wat	ter heat	ter (annual)1	12		1027.54	(64)
Heat gains fro	om water	heating	, kWh/m	onth 0.2	25 ´	[0.85	× (45)m	+ (6	i1)m] + 0.8 x	[(46)n	n + (57)m	+ (5	9)m]	
(65)m= 26.63	23.29	24.04	20.96	20.11	1	7.35	16.08	18.	45	18.67	21.76	23.75	25.	.79		(65)
include (57)m in calo	culation	of (65)n	n only if o	cylir	nder i	s in the c	dwel	ing o	or hot wa	ater is	from com	mun	ity h	eating	
5. Internal g	gains (see	e Table	5 and 5a	ı):												
Metabolic gai	ns (Table	e 5), Wa	tts												_	
Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	D	ec		
(66)m= 89.75	89.75	89.75	89.75	89.75	8	89.75	89.75	89.	75	89.75	89.75	89.75	89.	.75		(66)
Lighting gains	s (calcula	ted in A	ppendix	L, equa	tion	L9 oi	⁻ L9a), a	lso s	ee T	Table 5					-	
(67)m= 14.43	12.82	10.42	7.89	5.9	4	4.98	5.38	7	,	9.39	11.92	13.91	14.	.83		(67)
Appliances g	ains (calc	ulated i	n Appen	dix L, ec	quat	tion L	13 or L1	3a),	also	see Tab	le 5					
(68)m= 156.47	7 158.09	154	145.29	134.29	1:	23.96	117.06	115	.43	119.52	128.23	3 139.23	149	.56		(68)
Cooking gain	s (calcula	ated in A	ppendix	L, equa	tior	า L15	or L15a)), als	o se	e Table	5					
(69)m= 31.98	31.98	31.98	31.98	31.98	3	81.98	31.98	31.	98	31.98	31.98	31.98	31.	.98		(69)
Pumps and fa	ans gains	(Table	5a)							•		•			1	
(70)m= 0	0	0	0	0	Γ	0	0	0)	0	0	0	()		(70)
Losses e.g. e	vaporatio	n (nega	tive valu	ıes) (Tal	ble	5)				I					1	
(71)m= -71.8	-71.8	-71.8	-71.8	-71.8	1-	71.8	-71.8	-71	.8	-71.8	-71.8	-71.8	-7'	1.8		(71)
Water heating	g gains (T	r Table 5)			-				·	I					1	
(72)m= 35.8	34.66	32.31	29.11	27.03		24.1	21.61	24	.8	25.93	29.25	32.99	34.	.67		(72)
Total interna	l gains =		1	1	-	(66)	m + (67)m	ı 1 + (68	3)m +	- (69)m + (7	70)m +	(71)m + (72)	m		I	
(73)m= 256.62		r	232.21	217.15	2	02.97	193.97	197	.15	204.77	219.33	3 236.06	248	8.99		(73)
6. Solar gair		<u> </u>			<u> </u>											
Solar gains are	calculated	using sola	ar flux from	n Table 6a	and	assoc	ated equa	tions	to co	nvert to the	e applic	able orientat	ion.			
Orientation:			Area	ì		Flu				g_		FF			Gains	
	Table 6d		m²			Tal	ole 6a		Та	able 6b		Table 6c			(W)	
West 0.9x	0.77	x	8.	95	x	1	9.64	x		0.63	x	0.7		=	53.72	(80)
West 0.9x	0.77	x	8.	95	x	3	8.42	x		0.63	x	0.7		=	105.09	(80)
West 0.9x	0.77	x	8.	95	x	6	3.27	x		0.63	x	0.7		=	173.07	(80)
West 0.9x	0.77	×	8.	95	x	9	2.28	x		0.63	x	0.7		=	252.41	(80)
West 0.9x	0.77	×	8.	95	x	1	13.09	×		0.63	x	0.7		=	309.34	(80)
West 0.9x	0.77	×	8.	95	x	1	15.77	×		0.63	×	0.7		=	316.66	(80)
West 0.9x	0.77	×	8.	95	x	1	10.22	×		0.63	×	0.7		=	301.47	(80)
West 0.9x	0.77	×	8.	95	x	9	4.68	×		0.63	x	0.7		=	258.96	(80)
West 0.9x	0.77	×	8.	95	x	7	3.59	×		0.63	x	0.7		=	201.28	(80)
West 0.9x	0.77	×	8.	95	x	4	5.59	×		0.63	×	0.7		=	124.7	(80)
			L													

West 0.9x 0.77 × 8.95 × 24.49 × 0.63 × 0.7 = 66.98 (80)
West 0.9x 0.77 X 8.95 X 16.15 X 0.63 X 0.7 = 44.18 (80)
Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$ $(83)m = 53.72$ 105.09173.07252.41309.34316.66301.47258.96201.28124.766.9844.18(83)
Total gains – internal and solar $(84)m = (73)m + (83)m$, watts
(84)m= 310.34 360.59 419.72 484.62 526.48 519.63 495.45 456.11 406.05 344.03 303.04 293.17 (84)
7. Mean internal temperature (heating season)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)
Utilisation factor for gains for living area, h1,m (see Table 9a)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(86)m= 1 0.99 0.98 0.91 0.74 0.53 0.38 0.43 0.71 0.96 1 1 (86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)
$ (87)m = \begin{array}{c c c c c c c c c c c c c c c c c c c $
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.23 20.23 20.25 20.25 20.24 20.23 20.22 (88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)
(89)m= 1 0.99 0.97 0.88 0.69 0.47 0.32 0.36 0.65 0.94 0.99 1 (89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)
(90)m= 19.43 19.58 19.81 20.09 20.21 20.24 20.25 20.25 20.23 20.04 19.7 19.42 (90)
$fLA = \text{Living area} \div (4) = 0.46$ (91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$
(92)m= 19.76 19.91 20.15 20.43 20.56 20.59 20.6 20.6 20.58 20.37 20.03 19.75 (92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate
(93)m= 19.76 19.91 20.15 20.43 20.56 20.59 20.6 20.6 20.58 20.37 20.03 19.75 (93)
8. Space heating requirement
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Utilisation factor for gains, hm:
(94)m= 1 0.99 0.97 0.89 0.71 0.5 0.35 0.4 0.68 0.95 0.99 1 (94)
Useful gains, hmGm , W = (94)m x (84)m
(95)m= 309.47 357.82 408.2 431.63 375.73 258.31 172.92 180.81 274.57 325.15 300.91 292.58 (95)
Monthly average external temperature from Table 8
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]
$ (97)m = \begin{array}{c c c c c c c c c c c c c c c c c c c $
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 297.77 220.27 157.85 57.79 11.79 0 0 0 79.57 198.47 303.28
Space heating requirement for each month, kWh/month = $0.024 \times [(97)m - (95)m] \times (41)m$ (98)m= 297.77 220.27 157.85 57.79 11.79 0 0 0 79.57 198.47 303.28 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ (98)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 297.77 220.27 157.85 57.79 11.79 0 0 0 79.57 198.47 303.28

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	oss rate	e Lm (ca	lculated	using 28	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	407.06	320.45	327.83	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.99	1	0.99	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) = ((100)m x	: (101)m									
(102)m=	0	0	0	0	0	401.57	318.99	325.31	0	0	0	0		(102)
Gains	(solar (gains cal	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	675.15	645.61	600.72	0	0	0	0		(103)
	•			r month, : 3 × (98		lwelling,	continuo	ous (kW	(h) = 0.0	24 x [(10)3)m – (*	102)m]:	x (41)m	
(104)m=	0	0	0	0	0	196.98	243.01	204.91	0	0	0	0		
									Total	= Sum(104)	=	644.89	(104)
Cooled	I fractior	٦							f C =	cooled a	area ÷ (4	4) =	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	' = Sum(104)	=	0	(106)
Space	cooling	requirer	nent for	month =	(104)m	× (105)	× (106)r	n						
(107)m=	0	0	0	0	0	49.24	60.75	51.23	0	0	0	0		
									Total	= Sum(107)	=	161.22	(107)
Space	cooling	requirer	nent in k	(Wh/m²/y	/ear				(107)	÷ (4) =			3.01	(108)
8f. Fab	ric Ener	gy Effici	ency (ca	alculated	l only un	der spec	cial cond	litions, s	ee sectio	on 11)				
Fabric	Energy	/ Efficier	псу						(99) -	+ (108) =	=		27.78	(109)
Targe	et Fabri	c Energ	y Efficie	ency (TF	EE)								31.95	(109)

		ι	Jser Deta	ails:						
Assessor Name:	John Ashe		St	troma	Num	ber:		STRO	031268	
Software Name:	Stroma FSAP 20	12	S	oftwa	re Ver	sion:		Versio	n: 1.0.5.8	
		Pro	perty Ad	ldress:	Unit 31	- COPF	PETTS W	/OOD, L	ondon	
Address :										
1. Overall dwelling dime	nsions:									
0 14			Area(n			Av. He	ight(m)		Volume(m ³)	_
Ground floor			53.5	56	1a) x	2	.66	(2a) =	142.47	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	e)+(1n)	53.5	56	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	142.47	(5)
2. Ventilation rate:										
		secondary heating	ot	her		total			m ³ per hour	•
Number of chimneys	0 +	0	+	0	= [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0	i = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns				' <u>-</u>	2	x ^	10 =	20	(7a)
Number of passive vents						0	x ^	10 =	0	(7b)
Number of flueless gas fi	res					0	x 4	40 =	0	(7c)
								Air ch	anges per ho	⊐ ur
Infiltration due to chimned	in fluing and form	$(c_{n}) \cdot (c_{n}) \cdot (7_{n})$	(7b) (7c)		_					-
Infiltration due to chimney If a pressurisation test has b					ontinue fro	20		÷ (5) =	0.14	(8)
Number of storeys in th		<i>iou, procoou</i> i	o (11), our	0,11100 0		, (0) 10 (10)		0	(9)
Additional infiltration							[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timber	frame or 0	.35 for m	nasonry	constru	uction			0	(11)
	resent, use the value corre	sponding to th	he greater v	wall area	(after					
deducting areas of openir If suspended wooden f		aled) or 0.1	(sealed)	, else e	enter 0				0	(12)
If no draught lobby, ent		,	,						0	(13)
Percentage of windows	s and doors draught s	stripped							0	(14)
Window infiltration			0.2	25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8)) + (10) +	· (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cu	bic metres	per hour	r per so	uare me	etre of e	nvelope	area	5	(17)
If based on air permeabili	•								0.39	(18)
Air permeability value applie	•	as been done (or a degree	e air peri	meability i	s being u	sed			
Number of sides sheltere Shelter factor	a		(20	0) = 1 - [().075 x (1	9)] =			0	(19) (20)
Infiltration rate incorporat	ing shelter factor			1) = (18)					0.39	(21)
Infiltration rate modified for	0	d						I	0.00	
	Mar Apr May	<u> </u>	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor $(22a)m = (22a)m$	2)m ÷ 4									
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltr	ation rat	e (allow	ing for sl	nelter an	d wind s	speed) =	= (21a) x	(22a)m					
	0.5	0.49	0.48	0.43	0.42	0.37	0.37	0.36	0.39	0.42	0.44	0.46		
		ctive air	-	rate for t	he appli	cable ca	ise	•		•	•	-		
		al ventila											0	(23a)
			• • • •		, ,	, ,		N5)) , othe) = (23a)			0	(23b)
If bala	anced with	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fror	n Table 4h) =				0	(23c)
a) If	balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MV	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	ed mecha	anical ve	entilation	without	heat red	covery (I	MV) (24b	o)m = (22	2b)m + (23b)		-	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	iouse ex	tract ver	ntilation of	or positiv	'e input v	ventilatio	on from o	outside			•		
,					•	•		c) = (22b		.5 × (23t))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If	natural	ventilatio	n or wh	ole hous	e positiv	/e input	ventilati	on from I	loft			I	1	
,								0.5 + [(2		0.5]				
(24d)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	t 1d) in box	x (25)	•	•	•		
(25)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61]	(25)
				1	1	1	1	1	•	1	1	•	1	
		s and he												
ELEN	IENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/	K)	k-value kJ/m²-l		A X k kJ/K
Windo	WO	area	(111)		•			× v v / 112				K0/111-1		
	W5					8.95			0.04] =	7.78	╡,			(27)
Walls		27.4		8.95	;	18.48	3 X	0.15	=	2.77				(29)
		elements				27.43								(31)
							lated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
		as on both			is and pari	titions		(26)(30)) . (22) -					
		ss, W/K :	•	0)				(20)(30)					10.55	(33)
		Cm = S(. ,							(30) + (32		(32e) =	1108.8	
		parame	•							tive Value			100	(35)
	-	sments wh ad of a de			construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
		es : S (L				nondix I	K							(36)
	-	al bridging				-							4.11	(30)
	abric he		are not ki	101111 (30) -	- 0.00 x (5	1)			(33) +	(36) =			14.66	(37)
		at loss ca	alculated	d monthly	V					= 0.33 × (25)m x (5))	14.00	(0.)
ventile	Jan	Feb	Mar	Apr	, May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(38)m=	29.33	29.11	28.88	27.84	27.65	26.74	26.74	26.57	27.09	27.65	28.04	28.45		(38)
				27.04	27.05	20.74	20.74	20.57	27.09	27.03	20.04	20.43	J	(00)
Heat tr	ransfer o		nt, W/K		r	r			(39)m	= (37) + (38)m		1	
(39)m=	43.99	43.77	43.55	42.5	42.31	41.4	41.4	41.23	41.75	42.31	42.7	43.12		
		ver at a r /l		/100.21						Average =		12 /12=	42.5	(39)
	· ·	ameter (H	, 		0.70	0.77	0.77	0.77	<u> </u>	= (39)m ÷	r		1	
(40)m=	0.82	0.82	0.81	0.79	0.79	0.77	0.77	0.77	0.78	0.79	0.8	0.8	0.70	
Numbe	er of day	ys in moi	nth (Tah	le 1a)						Average =	Sum(40)₁	12 /12=	0.79	(40)
	Jan	Feb	Mar		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
	Jan			Apr	Iviay	Jun		I Aug	l Seh				J	

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
													I	
4. Wa	ater hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				([1 - exp	(-0.0003	349 x (TF	-13.9)2)] + 0.(0013 x (⁻	TFA -13.		.8		(42)
Annua <i>Reduce</i>	l averag	je hot wa al average	hot water	ge in litre usage by r day (all w	5% if the c	lwelling is	designed t			se target o		5.83		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	84.52	81.44	78.37	75.3	72.22	69.15	69.15	72.22	75.3	78.37	81.44	84.52		_
Energy o	content of	hot water	used - ca	lculated m	onthly $= 4$.	190 x Vd,r	n x nm x D)))))))))))))))))))			m(44) ₁₁₂ = ables 1b, 1		921.99	(44)
(45)m=	125.33	109.62	113.12	98.62	94.63	81.66	75.67	86.83	87.86	102.4	111.77	121.38		
lf instan	taneous v	ı vəter heati	na at poin	t of use (no	hot wate	storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1208.88	(45)
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage													
-		. ,		ng any so			-		ame ves	sel		0		(47)
		-		ank in dw	-			. ,		or (0) in (47)			
	vise it no storage		not wate	er (this ir	iciudes i	nstantar	neous co	inod idmo	ers) ente	er '0' in (47)			
	-		eclared l	oss facto	or is kno	wn (kWł	n/dav).					0	1	(48)
		actor fro					"uay).					0		(40)
				, kWh/ye	ear			(48) x (49) =			0		(50)
			•	cylinder		or is not		(10) / (10)	,			0	l	(00)
		-		rom Tab	le 2 (kW	h/litre/da	ıy)					0		(51)
	-	heating s		on 4.3									L	
		from Ta										0		(52)
•		actor fro										0		(53)
			•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	(54) in (5										0		(55)
Water	storage	loss cal	culated	for each	month	-	-	((56)m = ((55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contain	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	a cylinde	r thermo	stat)	-		
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	106.53	93.18	96.15	83.82	80.43	69.41	64.32	73.8	74.68	87.04	95.01	103.17		(62)

Solar DHW ir	put calculated	using App	endix G o	r Appendix	H (nega	tive quantit	y) (ent	er '0' if no se	olar contrib	oution to wate	er heating)		
(add additi	onal lines if	FGHRS	and/or \	WWHRS	applie	s, see Ap	pend	lix G)					
(63)m= (0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output fror	n water hea	ter			_								
(64)m= 106	6.53 93.18	96.15	83.82	80.43	69.41	64.32	73.	8 74.68	8 87.04	95.01	103.17		
			•	•		•		Output from	water hea	iter (annual)	112	1027.54	(64)
Heat gains	from water	heating	, kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	n + (6	1)m] + 0.8	3 x [(46)ı	m + (57)m	+ (59)m]	
(65)m= 26	.63 23.29	24.04	20.96	20.11	17.35	16.08	18.4	45 18.67	21.76	3 23.75	25.79		(65)
include (57)m in calo	culation	of (65)m	only if c	ylinder	is in the	dwell	ing or hot	water is	from com	n Imunity h	heating	
5. Interna	al gains (see	e Table 5	5 and 5a):									
	gains (Table			,									
	an Feb	Mar	Apr	May	Jun	Jul	A	ug Se	o Oct	t Nov	Dec		
(66)m= 89	.75 89.75	89.75	89.75	89.75	89.75	89.75	89.	-		5 89.75	89.75		(66)
Lighting ga	ains (calcula	ted in A	pendix	L, equat	ion L9 d	or L9a), a	lso s	ee Table	5		<u> </u>	1	
(67)m= 14	<u> </u>	10.42	7.89	5.9	4.98	5.38	7			2 13.91	14.83]	(67)
	s gains (calc	ulated ir	Append	dix L, eq	uation I	_13 or L1	3a), a	also see 7	Table 5			1	
(68)m= 156	<u> </u>	154	145.29	134.29	123.96	1	115			3 139.23	149.56]	(68)
Cooking ga	ains (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o see Tab	ble 5			1	
(69)m= 31	`	31.98	31.98	31.98	31.98	31.98	31.9			3 31.98	31.98]	(69)
Pumps and	d fans gains	(Table :	1 5a)			<u> </u>	I		!	1	ļ	1	
·	0 0	0	0	0	0	0	0	0	0	0	0]	(70)
	. evaporatio	n (nega	ı tive valu	es) (Tab	le 5)	1					ļ	1	
(71)m= -7 ⁴		-71.8	-71.8	-71.8	-71.8	-71.8	-71	.8 -71.8	-71.8	-71.8	-71.8]	(71)
Water hea	ting gains (T	able 5)	I	I		1					L	1	
(72)m= 35		32.31	29.11	27.03	24.1	21.61	24.	8 25.93	3 29.25	5 32.99	34.67]	(72)
Total inter	nal gains =	I			(66	β)m + (67)n	1 n + (68)m + (69)m	+ (70)m +	(71)m + (72)m	1	
	6.62 255.5		232.21	217.15	202.97	193.97	197	15 204.7	7 219.3	3 236.06	248.99]	(73)
6. Solar g	ains:		<u> </u>	I		•			I		1	<u>,</u>	
Solar gains	are calculated	using sola	r flux from	Table 6a	and asso	ciated equa	ations	o convert to	the applic	able orienta	tion.		
Orientation	n: Access F		Area			ux		g_		FF		Gains	
	Table 6d		m²		Та	able 6a		Table 6	ib	Table 6c		(W)	
West 0	.9x 0.77	x	8.9	95	x	19.64	x	0.63	x	0.7	=	53.72	(80)
West 0	.9x 0.77	x	8.9	95	x	38.42	x	0.63	x	0.7	=	105.09	(80)
West 0	.9x 0.77	x	8.9	95	x	63.27	x	0.63	x	0.7	=	173.07	(80)
West 0	.9x 0.77	x	8.9	95	x	92.28	x	0.63	x	0.7	=	252.41	(80)
West 0	.9x 0.77	x	8.9	95	x	113.09	x	0.63	x	0.7	=	309.34	(80)
West 0	.9x 0.77	x	8.9	95	x	115.77	x	0.63	x	0.7	=	316.66	(80)
West 0	.9x 0.77	x	8.9	95	x	110.22	x	0.63	x	0.7	=	301.47	(80)
West 0	.9x 0.77	x	8.9	95	x	94.68	×	0.63	x	0.7	=	258.96	(80)
West 0	.9x 0.77	x	8.9	95	x	73.59	x	0.63	x	0.7	=	201.28	(80)
Weet o	0						i i						

x

8.95

45.59

х

x

0.63

х

0.7

=

West

0.9x

0.77

124.7

(80)

West	0.9x	0.77	x	8.9	5	x 🗖	24.49	1 x 🗖	0.63	⊐ × Г	0.7	=	66.98	(80)
West	0.9x	0.77	x	8.9		×	16.15] ^ []	0.63		0.7		44.18	(80)
		0.77	^			^ L	10.10		0.00		0.7]	44.10	(00)
Solar gai	ins in v	vatts. ca	alculated	for eac	h month			(83)m = S	um(74)m .	(82)m				
Ŭ,	53.72	105.09	173.07	252.41	309.34	316.66	301.47	258.96	201.28	124.7	66.98	44.18		(83)
Total gai	ins – in	ternal a	nd solar	(84)m =	= (73)m ·	+ (83)n	n, watts						1	
(84)m= 3	310.34	360.59	419.72	484.62	526.48	519.63	495.45	456.11	406.05	344.03	303.04	293.17		(84)
7. Mear	n interr	nal temp	erature	(heating	season)	•	•			•		- 	
Temper	rature o	during h	eating p	eriods ir	n the livii	ng area	a from Tal	ble 9, Th	1 (°C)				21	(85)
Utilisati	on fact	or for g	ains for I	iving are	ea, h1,m	(see T	able 9a)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.96	0.94	0.89	0.79	0.65	0.48	0.36	0.4	0.63	0.85	0.94	0.97		(86)
Mean ir	nternal	tempera	ature in	living are	ea T1 (fo	ollow st	eps 3 to 7	7 in Tabl	e 9c)				-	
	19.36	19.62	20.03	20.5	20.8	20.95	-i	20.98	20.87	20.44	19.83	19.33		(87)
Temper	rature o	durina h	eating p	eriods ir	n rest of	dwellin	g from Ta	able 9. T	h2 (°C)				1	
·	20.23	20.24	20.24	20.26	20.26	20.28	<u> </u>	20.28	20.27	20.26	20.26	20.25		(88)
L Itilisati	on fact	or for a	ains for i	est of d	welling	h2 m («	see Table	9a)					1	
_	0.96	0.93	0.88	0.77	0.61	0.44	0.3	0.34	0.58	0.83	0.94	0.97		(89)
	tornol	tompor		the reat					l 7 in Tobl				l	
_	18.72	18.98	19.38	19.84	20.11	20.24	(follow ste	20.27	20.18	19.79	19.2	18.7]	(90)
(00)	10.72	10.00	10.00	10.01	20.11	0	20.27	20.27	20.10	10.70	10.2	10.7		()
								ļ	l f	LA = Livin	g area ÷ (4	4) =	0.46	(91)
Maanin							4	. /4 . 41		LA = Livin	g area ÷ (4	4) =	0.46	(91)
			<u> </u>			1 <u> </u>	fLA × T1	r `	A) × T2	r	-		0.46]
(92)m=	19.02	19.28	19.68	20.15	20.43	20.57	20.6	20.6	A) × T2	20.09	g area ÷ (4 19.49	4) = 18.99	0.46	(91)
(92)m= Apply a	19.02 Idjustm	19.28 ent to th	19.68	20.15	20.43	20.57	1	20.6	A) × T2	20.09	-		0.46]
(92)m= Apply a (93)m=	19.02 Idjustm 19.02	19.28 ent to th 19.28	19.68 ne mean 19.68	20.15 internal 20.15	20.43 temper	20.57 ature fi	20.6 om Table	20.6 4e, whe	-A) × T2 20.5 ere appro	20.09 opriate	19.49	18.99	0.46	(92)
(92)m= Apply a (93)m= 8. Space	19.02 Idjustm 19.02 ce heat	19.28 ent to th 19.28 ing requ	19.68 ne mean 19.68 uirement	20.15 internal 20.15	20.43 temper 20.43	20.57 ature fi 20.57	20.6 om Table	20.6 20.6 20.6	A) × T2 20.5 ere appro 20.5	20.09 opriate 20.09	19.49 19.49	18.99		(92)
(92)m= Apply a (93)m= 8. Spac Set Ti to	19.02 ndjustm 19.02 ce heat o the m	19.28 ent to th 19.28 ing requinean int factor fo	19.68 ne mean 19.68 uirement	20.15 internal 20.15 nperatur	20.43 temper 20.43 re obtain	20.57 ature fi 20.57	20.6 rom Table 20.6 step 11 of	20.6 20.6 20.6	A) × T2 20.5 20.5 20.5 b, so tha	20.09 opriate 20.09 t Ti,m=(19.49 19.49	18.99		(92)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis	19.02 djustm 19.02 ce heat o the m sation f	19.28 eent to th 19.28 ing requiner nean int factor fo Feb	19.68 ne mean 19.68 uirement ernal ter or gains Mar	20.15 internal 20.15 nperatur using Ta Apr	20.43 temper 20.43 re obtain	20.57 ature fi 20.57	20.6 rom Table 20.6	20.6 20.6 20.6	A) × T2 20.5 ere appro 20.5	20.09 opriate 20.09	19.49 19.49	18.99		(92)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis	19.02 Idjustm 19.02 Ise heat o the m sation f Jan on fact	19.28 ent to th 19.28 ing require nean int factor for Feb	19.68 ne mean 19.68 Jirement ernal ter or gains Mar ains, hm	20.15 internal 20.15 nperatur using Ta Apr :	20.43 temper 20.43 re obtain ble 9a May	20.57 ature fr 20.57 ned at s	20.6 rom Table 20.6 step 11 of Jul	20.6 20.6 20.6 Table 9 Aug	A) × T2 20.5 ere appro 20.5 b, so tha Sep	20.09 opriate 20.09 t Ti,m=(Oct	19.49 19.49 76)m an Nov	18.99 18.99 d re-calc Dec		(92) (93)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisatio (94)m=	19.02 djustm 19.02 ce heat o the m sation t Jan on fact 0.95	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92	19.68 ne mean 19.68 uirement ernal ter or gains Mar ains, hm 0.87	20.15 internal 20.15 nperatur using Ta Apr : 0.76	20.43 temper 20.43 re obtain ble 9a May 0.62	20.57 ature fi 20.57 ned at s	20.6 rom Table 20.6 step 11 of	20.6 20.6 20.6 7able 9	A) × T2 20.5 20.5 20.5 b, so tha	20.09 opriate 20.09 t Ti,m=(19.49 19.49 76)m an	18.99 18.99 d re-calc		(92)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisation (94)m= Useful (19.02 adjustm 19.02 ce heat o the m sation f Jan 0.95 gains, l	19.28 ent to th 19.28 ing requinean int factor for Feb or for ga 0.92 hmGm ,	19.68 ne mean 19.68 uirement ernal ter or gains Mar ains, hm 0.87 W = (94	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m	20.57 ature fr 20.57 ned at s Jun 0.45	20.6 rom Table 20.6 step 11 of Jul 0.33	20.6 20.6 20.6 Table 9 Aug 0.37	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59	20.09 20.09 t Ti,m=(Oct 0.83	19.49 19.49 76)m an Nov 0.93	18.99 18.99 d re-calc Dec 0.96		(92) (93)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisatio (94)m= Useful ((95)m=2	19.02 djustm 19.02 ce heat o the m sation f Jan on fact 0.95 gains, I 294.91	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05	19.68 ne mean 19.68 uirement ernal ter or gains 0 Mar ains, hm 0.87 W = (94) 364.92	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46	20.57 ature fi 20.57 ned at s Jun 0.45 236.33	20.6 rom Table 20.6 step 11 of Jul 0.33	20.6 20.6 20.6 Table 9 Aug	A) × T2 20.5 ere appro 20.5 b, so tha Sep	20.09 opriate 20.09 t Ti,m=(Oct	19.49 19.49 76)m an Nov	18.99 18.99 d re-calc Dec		(92) (93)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisatio (94)m= Useful ((95)m=2	19.02 djustm 19.02 ce heat o the m sation f Jan on fact 0.95 gains, I 294.91	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05	19.68 ne mean 19.68 uirement ernal ter or gains Mar ains, hm 0.87 W = (94	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46	20.57 ature fi 20.57 ned at s Jun 0.45 236.33	20.6 rom Table 20.6 step 11 of Jul 0.33	20.6 20.6 20.6 Table 9 Aug 0.37	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59	20.09 20.09 t Ti,m=(Oct 0.83	19.49 19.49 76)m an Nov 0.93	18.99 18.99 d re-calc Dec 0.96		(92) (93)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilisation (94)m= Useful ((95)m= Monthly (96)m=	19.02 idjustm 19.02 ce heat o the m sation f Jan 0.95 gains, I 294.91 y avera 4.3	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05 inge exte 4.9	19.68ne mean19.68uirementernal teror gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 e from Ta 11.7	20.57 ature fi 20.57 ned at s Jun 0.45 236.33 able 8 14.6	20.6 rom Table 20.6 step 11 of Jul 0.33 162.97	20.6 20.6 20.6 Table 9 Aug 0.37 169.06	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74	20.09 priate 20.09 t Ti,m=(Oct 0.83 284 10.6	19.49 19.49 76)m an Nov 0.93 280.72	18.99 18.99 d re-calc Dec 0.96 280.54		(92) (93) (94) (95)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisation (94)m= Useful ((95)m= Monthly (96)m= Heat los	19.02 idjustm 19.02 ce heat o the m sation f Jan 0.95 gains, I 294.91 y avera 4.3	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05 inge exte 4.9	19.68ne mean19.68uirementernal teror gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 e from Ta 11.7	20.57 ature fi 20.57 ned at s Jun 0.45 236.33 able 8 14.6	20.6 rom Table 20.6 tep 11 of Jul 0.33 162.97 16.6 7 =[(39)m	20.6 20.6 20.6 Table 9 Aug 0.37 169.06	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74	20.09 priate 20.09 t Ti,m=(Oct 0.83 284 10.6	19.49 19.49 76)m an Nov 0.93 280.72	18.99 18.99 d re-calc Dec 0.96 280.54		(92) (93) (94) (95)
(92)m= (Apply a (93)m= (8. Space Set Ti to the utilis Utilisation (94)m= (Useful ((95)m= (2) Monthly (96)m= (Heat los (97)m= (6)	19.02 idjustm 19.02 idjustm 19.02 ice heat o the m sation f Jan On fact 0.95 gains, I 294.91 y avera 4.3 ss rate 647.38	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05 ige exte 4.9 for mea 629.26	19.68ne mean19.68uirementernal teror gainsor gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5an intern573.97	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9 al tempe 478	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 e from Ta 11.7 erature, 369.34	20.57 ature fi 20.57 aed at s Jun 0.45 236.33 able 8 14.6 Lm , W 247.13	20.6 rom Table 20.6 tep 11 of Jul 0.33 162.97 16.6 7 =[(39)m	20.6 20.6 20.6 Table 9 Aug 0.37 169.06 16.4 x [(93)m 173.08	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74 14.1 – (96)m 267.25	20.09 priate 20.09 t Ti,m=(Oct 0.83 284 10.6] 401.72	19.49 19.49 76)m an Nov 0.93 280.72 7.1 529.21	18.99 18.99 d re-calc Dec 0.96 280.54 4.2		(92) (93) (94) (95) (96)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisation (94)m= Useful ((95)m= Monthly (96)m= Heat los (97)m= Space h	19.02 idjustm 19.02 idjustm 19.02 ice heat o the m sation f Jan On fact 0.95 gains, I 294.91 y avera 4.3 ss rate 647.38	19.28 eent to th 19.28 ing required nean int factor for Feb or for ga 0.92 hmGm , 333.05 ige exte 4.9 for mea 629.26	19.68ne mean19.68uirementernal teror gainsor gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5an intern573.97	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9 al tempe 478	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 e from Ta 11.7 erature, 369.34	20.57 ature fi 20.57 aed at s Jun 0.45 236.33 able 8 14.6 Lm , W 247.13	20.6 com Table 20.6 tep 11 of Jul 0.33 162.97 16.6 (39)m 165.66	20.6 20.6 20.6 Table 9 Aug 0.37 169.06 16.4 x [(93)m 173.08	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74 14.1 – (96)m 267.25	20.09 priate 20.09 t Ti,m=(Oct 0.83 284 10.6] 401.72	19.49 19.49 76)m an Nov 0.93 280.72 7.1 529.21	18.99 18.99 d re-calc Dec 0.96 280.54 4.2		(92) (93) (94) (95) (96)
(92)m= Apply a (93)m= 8. Space Set Ti to the utilis Utilisation (94)m= Useful ((95)m= Monthly (96)m= Heat los (97)m= Space h	19.02 idjustm 19.02 idjustm 19.02 idjustm idjustm idjustm idjustm o the m sation f Jan on fact 0.95 gains, I 294.91 y avera 4.3 ss rate 647.38 heating	19.28 eent to th 19.28 ing required factor for Feb or for ga 0.92 hmGm , 333.05 ige exte 4.9 for mea 629.26 g require	19.68ne mean19.68uirementernal teror gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5an intern573.97ement for	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9 al tempe 478 r each m	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 e from Ta 11.7 erature, 369.34 nonth, ky	20.57 ature fi 20.57 ned at s Jun 0.45 236.33 able 8 14.6 Lm , W 247.13 Wh/mo	20.6 rom Table 20.6 20.6 tep 11 of Jul 0.33 162.97 16.6 7 =[(39)m 165.66 nth = 0.02	20.6 20.6 20.6 Table 9 Aug 0.37 169.06 16.4 x [(93)m 173.08 24 x [(97 0	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74 14.1 - (96)m 267.25)m - (95	20.09 ppriate 20.09 t Ti,m=(Oct 0.83 284 10.6] 401.72)m] x (4 87.59	19.49 19.49 76)m an Nov 0.93 280.72 7.1 529.21 1)m 178.91	18.99 18.99 d re-calc Dec 0.96 280.54 4.2 637.81 265.8		(92) (93) (94) (95) (96)
$(92)m = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	19.02 idjustm 19.02 idjustm 19.02 idjustm o the m sation f Jan on fact 0.95 gains, I 294.91 y avera 647.38 heating 262.24	19.28 ent to th 19.28 ing required factor for Feb or for ga 0.92 hmGm , 333.05 ige exte 4.9 for mea 629.26 g required 199.05	19.68ne mean19.68uirementernal teror gainsMarains, hm 0.87 W = (94)364.92rnal tem6.5an intern573.97ement for	20.15 internal 20.15 nperatur using Ta Apr : 0.76 i)m x (84 370.21 perature 8.9 al tempe 478 r each m 77.61	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 2 from Ta 2 from Ta 11.7 erature, 369.34 nonth, kV 31.9	20.57 ature fi 20.57 ned at s Jun 0.45 236.33 able 8 14.6 Lm , W 247.13 Wh/mo	20.6 rom Table 20.6 20.6 tep 11 of Jul 0.33 162.97 16.6 7 =[(39)m 165.66 nth = 0.02	20.6 20.6 20.6 Table 9 Aug 0.37 169.06 16.4 x [(93)m 173.08 24 x [(97 0	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74 14.1 - (96)m 267.25)m - (95 0	20.09 ppriate 20.09 t Ti,m=(Oct 0.83 284 10.6] 401.72)m] x (4 87.59	19.49 19.49 76)m an Nov 0.93 280.72 7.1 529.21 1)m 178.91	18.99 18.99 d re-calc Dec 0.96 280.54 4.2 637.81 265.8	 culate 	(92) (93) (94) (95) (96) (97)
$(92)m = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	19.02 idjustm 19.02 idjustm 19.02 idjustm o the m sation f Jan On fact 0.95 gains, I 294.91 y avera 647.38 heating 262.24 heating	19.28 ent to th 19.28 ing required factor for Feb or for ga 0.92 hmGm , 333.05 ige exte 4.9 for mea 629.26 g required 199.05	19.68ne mean19.68uirementernal teror gains (Mar)Marains, hm 0.87 W = (94)364.92rnal tem6.5an intern573.97ement fo155.53	20.15 internal 20.15 nperatur using Ta Apr : 0.76 4)m x (84 370.21 perature 8.9 al tempe 478 r each m 77.61	20.43 temper 20.43 re obtain ble 9a May 0.62 4)m 326.46 2 from Ta 2 from Ta 11.7 erature, 369.34 nonth, kV 31.9	20.57 ature fi 20.57 ned at s Jun 0.45 236.33 able 8 14.6 Lm , W 247.13 Wh/mo	20.6 rom Table 20.6 20.6 tep 11 of Jul 0.33 162.97 16.6 7 =[(39)m 165.66 nth = 0.02	20.6 20.6 20.6 Table 9 Aug 0.37 169.06 16.4 x [(93)m 173.08 24 x [(97 0	A) × T2 20.5 20.5 20.5 b, so tha Sep 0.59 240.74 14.1 - (96)m 267.25)m - (95 0	20.09 ppriate 20.09 t Ti,m=(Oct 0.83 284 10.6] 401.72)m] x (4 87.59	19.49 19.49 76)m an Nov 0.93 280.72 7.1 529.21 1)m 178.91	18.99 18.99 d re-calc Dec 0.96 280.54 4.2 637.81 265.8	culate	(92) (93) (94) (95) (96) (97) (98)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I	oss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	389.18	306.38	313.38	0	0	0	0		(100)
Utilisa	tion fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.93	0.96	0.94	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) = ((100)m x	(101)m									
(102)m=	0	0	0	0	0	361.32	293.06	296.05	0	0	0	0		(102)
Gains	(solar g	gains ca	culated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	675.15	645.61	600.72	0	0	0	0		(103)
•		<i>g require</i> zero if (lwelling,	continue	ous (kW	′h) = 0.0.	24 x [(10)3)m – (102)m]:	x (41)m	
(104)m=	0	0	0	0	0	225.96	262.3	226.68	0	0	0	0		
									Total	= Sum(104)	=	714.94	(104)
Cooled	fraction	n							f C =	cooled a	area ÷ (4	1) =	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	' = Sum(104)	=	0	(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	n						
(107)m=	0	0	0	0	0	56.49	65.57	56.67	0	0	0	0		_
									Total	= Sum(107)	=	178.73	(107)
Space	cooling	requirer	nent in k	«Wh/m²/y	/ear				(107)	÷ (4) =			3.34	(108)
8f. Fab	ric Ene	rgy Effici	ency (ca	alculated	l only un	der spec	cial cond	litions, s	ee sectio	on 11)				
Fabric	Energ	y Efficier	псу						(99) ·	+ (108) =	=		26.84	(109)

		ι	Jser Details						
Assessor Name:	John Ashe		Stro	na Num	ber:		STRO	031268	
Software Name:	Stroma FSAP 20 ²	12	Soft	ware Ve	rsion:		Versio	n: 1.0.5.8	
		Pro	perty Addre	s: Unit 31	- COPF	PETTS V	VOOD, L	ondon	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			Area(m ²) 53.56	(1a) x		ight(m) .66	(2a) =	Volume(m ³ 142.47) (3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	53.56	(4)			-		_
Dwelling volume			L	(3a)+(3b)+(3c)+(3c	l)+(3e)+	.(3n) =	142.47	(5)
2. Ventilation rate:									_
		econdary heating	other		total			m ³ per hou	r
Number of chimneys		0	+ 0	=	0	X	40 =	0	(6a)
Number of open flues	0 +	0	+ 0		0	x	20 =	0	(6b)
Number of intermittent fa	ins			L	0	x	10 =	0	(7a)
Number of passive vents	i			Г	0	x ·	10 =	0	(7b)
Number of flueless gas fi	res			Г	0	x 4	40 =	0	(7c)
				L]	A in a b		
				F			1	anges per ho	_
Infiltration due to chimne If a pressurisation test has b				e continue fi	0 0 (9) to		÷ (5) =	0	(8)
Number of storeys in the			o (<i>11),</i> outorink		011 (0) 10 ((10)		0	(9)
Additional infiltration	0,,,,					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber	frame or 0	.35 for mase	nry consti	ruction			0	(11)
if both types of wall are p deducting areas of openii	resent, use the value corres	sponding to th	e greater wall	area (after					
If suspended wooden f		led) or 0.1	(sealed), els	e enter 0				0	(12)
If no draught lobby, en			. ,					0	(13)
Percentage of windows	s and doors draught s	tripped						0	(14)
Window infiltration			0.25 -	0.2 x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8) + (1	0) + (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	• •				etre of e	envelope	area	5	(17)
If based on air permeabil	•							0.25	(18)
Air permeability value applie Number of sides sheltere		is been done o	or a degree air	permeability	is being u	sed			
Shelter factor	eu -		(20) =	- [0.075 x (1	19)] =			0	(19) (20)
Infiltration rate incorporat	ting shelter factor			18) x (20) =				0.25	(21)
Infiltration rate modified f	C C	d						0.20	
Jan Feb	Mar Apr May	Jun	Jul Au	g Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8 3.7	4	4.3	4.5	4.7		
Wind Factor $(22a)m = (2)$	2)m ÷ 4								
	1.23 1.1 1.08	0.95	0.95 0.92	1	1.08	1.12	1.18		
· · · · ·	· · ·	·•	•		-	-	-	•	

Adjust	ed infiltr	ation 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		
		ctive air	-	rate for t	he appli	cable ca	se	-						
		al ventila			ol.) (00 -) (00-)			0.5	(23a)
			0 11		, (, ,		N5)) , othe	,) = (23a)			0.5	(23b)
lf bala	anced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				77.35	(23c)
a) If	balance	ed mecha	anical ve	entilation	with hea	at recov	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 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	balance	ed mecha	anical ve	entilation	without	heat red	covery (I	MV) (24b	o)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	iouse ex	tract ver	ntilation of	or positiv	e input v	ventilatio	on from a	outside				-	
i	if (22b)r	n < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,						•		on from l		_				
	r í í	r	r , ,	r ·	,	,	r	0.5 + [(2	r [′]		1	r	I	
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b) or (24	c) or (24	d) in box	x (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. He	at losse	s and he	eat loss i	paramet	er:									
ELEN		Gros		Openin		Net Ar	ea	U-valı	ue	AXU		k-value	e A	A X k
		area	-	m	-	A ,r		W/m2		(W/I	K)	kJ/m²·l		J/K
Windo	WS					8.95	x1	/[1/(0.9)+	0.04] =	7.78				(27)
Walls		27.4	3	8.95	;	18.48	3 X	0.15		2.77				(29)
Total a	rea of e	elements	, m²			27.43	3							(31)
* for win	dows and	l roof wind	ows, use e	effective wi	ndow U-va	lue calcul	ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
** inclua	le the area	as on both	sides of ir	nternal wal	ls and part	itions								
Fabric	heat los	ss, W/K =	= S (A x	U)				(26)(30)) + (32) =				10.55	(33)
Heat c	apacity	Cm = S((Axk)						((28).	.(30) + (32	2) + (32a).	(32e) =	1108.8	(34)
Therm	al mass	parame	ter (TMF		- TFA) ir	ı kJ/m²K			Indica	tive Value	: Low		100	(35)
For desi	ign asses	sments wh	ere the de	tails of the	construct	on are no	t known pi	recisely the	e indicative	values of	TMP in Ta	able 1f		
		ad of a de												
	•	es : S (L	,		• •	•	Κ						4.11	(36)
	<i>of therma</i> abric he	al bridging	are not kn	iown (36) =	= 0.05 x (3	1)			(33) +	(36) =			11.00	(27)
		at loss ca	alculator	monthly						= 0.33 × (25)m x (5)		14.66	(37)
VEITUR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.31	20.02	19.72	18.25	17.96	16.49	16.49	16.2	17.08	17.96	18.55	19.14		(38)
				10.20	11.00	10.10	10.10	10.2				10.11		()
		coefficier	r							= (37) + (3	-		l	
(39)m=	34.97	34.68	34.38	32.92	32.62	31.15	31.15	30.86	31.74	32.62	33.21	33.8		
Heat lo	oss para	ameter (H	HLP). W	/m²K						Average = = (39)m ÷		12 /12=	32.84	(39)
(40)m=	0.65	0.65	0.64	0.61	0.61	0.58	0.58	0.58	0.59	0.61	0.62	0.63		
(L							Average =			0.61	(40)
Numbe	er of day	/s in moi	nth (Tab	le 1a)							. (/)			` `
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	l	(41)
4. Wat	ter heati	na ener	gy requi	rement:								kWh/ye	ear:	
		, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0)013 x (⁻	TFA -13		.8		(42)
			ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		76	.83		(43)
		-	hot water person per			-	-	to achieve	a water us	se target o	f			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)		-				
(44)m=	84.52	81.44	78.37	75.3	72.22	69.15	69.15	72.22	75.3	78.37	81.44	84.52		_
Energy c	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		921.99	(44)
(45)m=	125.33	109.62	113.12	98.62	94.63	81.66	75.67	86.83	87.86	102.4	111.77	121.38		
lf instanta	aneous wa	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	•	1208.88	(45)
(46)m=	18.8	16.44	16.97	14.79	14.19	12.25	11.35	13.02	13.18	15.36	16.77	18.21		(46)
Water s	-		ingludin	a			otorogo	within or						
-		. ,	ind no ta				-	within sa	ame ves	sei		0		(47)
	-	-			-			(47) mbi boil	ers) ente	er '0' in (47)			
Water s				V ²					/	(
a) If ma	anufactu	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temper	rature fa	actor fro	m Table	2b								0		(49)
•••			storage					(48) x (49)	=		1	10		(50)
			eclared of factor fr	•							0	02		(51)
		-	ee sectio		0 2 (100	n, na 0, ac	·y)				0.	02		(01)
Volume	e factor f	rom Tal	ble 2a								1.	03		(52)
Temper	rature fa	actor fro	m Table	2b							0	.6		(53)
•••			storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	03		(54)
· ·	50) or (, ,	,								1.	03		(55)
Water s	storage	loss cal	culated f	or each	month	i	i	((56)m = (55) × (41)ı	m	1	i	L	
(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 cylindei			d solar sto	rage, (57)i	m = (56)m	r	H11)] ÷ (5	0), else (5 ⁻		· · · · ·	1	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)
•		•	inual) fro									0		(58)
-					,	,	• •	65 × (41)			- + - +)			
Г		21.01	23.26	e H5 If t 22.51	23.26	22.51	23.26	ng and a	22.51	r thermo 23.26	<u>,</u>	22.26	l	(59)
(59)m=	23.26								22.31	23.20	22.51	23.26		(55)
г	r		for each			<u> </u>	<u> </u>	, T		-	-	-	I	
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
г	<u> </u>					i	i	· /		, 	r í	r í	(59)m + (61)n I	
(62)m=	180.61	159.55	168.39	152.11	149.9	135.15	130.94	142.1	141.36	157.67	165.27	176.66		(62)

	calculated						., .				n noading)		
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix	G)				_	
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	vater hea	ter										_	
(64)m= 180.61	159.55	168.39	152.11	149.9	135.15	130.94	142.1	141.36	157.67	165.27	176.66		
							Out	put from wa	ater heat	er (annual) ₁	12	1859.72	(64)
Heat gains fro	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	n + (61)r	n] + 0.8 x	: [(46)n	n + (57)m	+ (59)m]	
(65)m= 85.9	76.39	81.83	75.59	75.68	69.95	69.38	73.09	72.01	78.27	79.96	84.58		(65)
include (57)m in calo	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot wa	ater is	from com	munity h	- neating	
5. Internal g	ains (see	e Table 5	and 5a):									
Metabolic gai	ns (Table	e 5), Wat	ts									_	
Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 89.75	89.75	89.75	89.75	89.75	89.75	89.75	89.75	89.75	89.75	89.75	89.75		(66)
Lighting gains	s (calcula	ted in Ap	opendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				-	
(67)m= 14.43	12.82	10.42	7.89	5.9	4.98	5.38	7	9.39	11.92	13.91	14.83		(67)
Appliances ga	ains (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Tab	ole 5	•			
(68)m= 156.47	158.09	154	145.29	134.29	123.96	117.06	115.43	119.52	128.23	139.23	149.56		(68)
Cooking gain	s (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also s	ee Table	5	•		1	
(69)m= 31.98	31.98	31.98	31.98	31.98	31.98	31.98	31.98	31.98	31.98	31.98	31.98]	(69)
Pumps and fa	ans dains	(Table 5	5a)	I			Į	1 1		1		1	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. e	vaporatio	n (negat	tive valu	es) (Tab	le 5)			11				1	
(71)m= -71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8	-71.8]	(71)
Water heating	u dains (T	able 5)						11				1	
(72)m= 115.45		109.99	104.98	101.73	97.15	93.25	98.24	100.01	105.2	111.06	113.68]	(72)
Total interna						1	L n + (68)m	11 + (69)m + (70)m + (71)m + (72)		1	
(73)m= 336.28			308.09	291.85					-	314.13]	(73)
6. Solar gair						<u> </u>	<u> </u>						
Solar gains are		using sola	r flux from	Table 6a	and assoc	ated equa	ations to c	onvert to th	o annlica	able orientat	ion.		
Orientation:	Access F	-	A						e applica				
		actor	Area		Flu				e applica	FF		Gains	
	Table 6d		Area m²				٦	g_ [able 6b				Gains (W)	
West 0.9x	Table 6d		m²		Та	IX .	r × [g_		FF	=		(80)
West 0.9x West 0.9x			m²	95	Ta	ix ble 6a	, <u> </u>	g_ Table 6b		FF Table 6c	=	(W)	(80)
	0.77	x	m²	95	Ta × ×;	ix ble 6a 19.64) × [g_ Fable 6b 0.63	×[FF Table 6c 0.7		(W) 53.72	
West 0.9x	0.77	x x	m ² 8.9 8.9 8.9	95 95 95	Ta × ×; ×;	IX ble 6a 19.64 38.42) × [g_ Fable 6b 0.63 0.63	× [FF Table 6c 0.7	=	(W) 53.72 105.09	(80)
West 0.9x West 0.9x	0.77 0.77 0.77	× × ×	m ² 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9	95 95 95 95	Ta × × ×	IX ble 6a 19.64 38.42 53.27 92.28) ×) ×) ×	9_ Table 6b 0.63 0.63 0.63	× [× [× [FF Table 6c 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41	(80) (80) (80)
West 0.9x West 0.9x West 0.9x	0.77 0.77 0.77 0.77 0.77	X X X X X	m ² 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9	95 95 95 95 95	Ta x x x x x x	IX ble 6a 19.64 38.42 53.27 92.28 13.09	X X X X	g_ Cable 6b 0.63 0.63 0.63 0.63 0.63	× [× [× [FF Table 6c 0.7 0.7 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41 309.34	(80) (80) (80) (80) (80)
West 0.9x West 0.9x West 0.9x West 0.9x	0.77 0.77 0.77 0.77 0.77 0.77		m ² 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9	95 95 95 95 95 95	Ta x x x x x x x x	IX ble 6a 19.64 38.42 53.27 52.28 13.09 15.77) × [g_ 0.63 0.63 0.63 0.63 0.63 0.63 0.63	× [× [× [× [FF Table 6c 0.7 0.7 0.7 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41 309.34 316.66	(80) (80) (80) (80) (80) (80)
West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x	0.77 0.77 0.77 0.77 0.77 0.77 0.77		m ² 8.5	95 95 95 95 95 95 95 95	Ta x x x x x x x x 1 x	IX ble 6a 19.64 38.42 63.27 92.28 13.09 15.77 10.22	X _ X _ X _ X _ X _ X _ X _ X _	g_ able 6b 0.63 0.63 0.63 0.63 0.63 0.63 0.63		FF Table 6c 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41 309.34 316.66 301.47	(80) (80) (80) (80) (80) (80) (80)
West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x	0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77		m ² 8.9	95 95 95 95 95 95 95 95	Ta x	IX ble 6a 19.64 38.42 33.27 92.28 13.09 15.77 10.22 94.68		g_ Cable 6b 0.63 0.63 0.63 0.63 0.63 0.63 0.63		FF Table 6c 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41 309.34 316.66 301.47 258.96	(80) (80) (80) (80) (80) (80) (80) (80)
West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x West 0.9x	0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77		m ² 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9	95 95 95 95 95 95 95 95 95	Ta x	IX ble 6a 19.64 38.42 63.27 92.28 13.09 15.77 10.22	X _ X _ X _ X _ X _ X _ X _ X _	g_ able 6b 0.63 0.63 0.63 0.63 0.63 0.63 0.63		FF Table 6c 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7		(W) 53.72 105.09 173.07 252.41 309.34 316.66 301.47	(80) (80) (80) (80) (80) (80) (80)

West (0.9x 0.77	×	8.9	15	x	24.49] × 🗖	0.63) x [0.7	=	66.98	(80)
	0.9x 0.77		8.9			16.15] x [0.63		0.7		44.18	(80)
	0.11	^	0.0	5	^	10.15		0.05		0.7		44.10	(00)
Solar gain	s in watts, c	alculated	l for eac	h month			(83)m = S	um(74)m .	(82)m				
ч <u> </u>	3.72 105.09	173.07	252.41	309.34	316.66	301.47	258.96	201.28	124.7	66.98	44.18		(83)
Total gain	s – internal a	and solar	[.] (84)m =	i = (73)m -	L + (83)m	, watts	I						
(84)m= 3	90 439.6	497.41	560.49	601.18	592.67	567.09	529.56	480.14	419.98	381.11	372.18		(84)
7 Mean	internal tem	oerature	(heating	season			1	1					
	ture during		, v			from Tal	ole 9. Th	1 (°C)				21	(85)
-	n factor for g				-		,	(-)					` ´
	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	.92 0.88	0.8	0.65	0.49	0.33	0.24	0.27	0.45	0.71	0.87	0.93		(86)
			living or				I 7 in Tohl						
	ernal tempe 0.09 20.3	20.58	20.85	20.96	20.99	21	21	20.98	20.83	20.47	20.09		(87)
							I		20.00	20.47	20.00		()
· · · · · · · · · · · · · · · · · · ·	ture during	1		i		- 1	1	r è é	00.40			1	(00)
(88)m= 20	0.38 20.39	20.39	20.42	20.42	20.45	20.45	20.45	20.44	20.42	20.41	20.4		(88)
Utilisatio	n factor for g	ains for	rest of d	welling, I	h2,m (s	ee Table	9a)	i	i	i	i		
(89)m= 0.	.91 0.87	0.78	0.62	0.46	0.31	0.21	0.24	0.41	0.68	0.85	0.92		(89)
Mean inte	ernal tempe	rature in	the rest	of dwelli	ng T2 (f	follow ste	eps 3 to	7 in Tabl	e 9c)			_	
(90)m= 19	9.16 19.46	19.86	20.24	20.38	20.44	20.45	20.45	20.42	20.22	19.71	19.17		(90)
								f	LA = Livin	g area ÷ (4	4) =	0.46	(91)
Mean into	ernal tempe	rature (fo	or the wh	ole dwe	lling) = f	LA x T1	+ (1 – fL		LA = Livin	g area ÷ (4	4) =	0.46	(91)
	ernal tempe 9.59 19.85	rature (fo	or the wh	ole dwe	lling) = f 20.7	LA × T1 20.7	+ (1 – fL 20.7		LA = Livin 20.5	g area ÷ (4 20.06	4) = 19.6	0.46	(91)
(92)m= 19		20.19	20.52	20.65	20.7	20.7	20.7	A) × T2 20.68	20.5		,	0.46	
(92)m= 19 Apply ad	0.59 19.85	20.19	20.52	20.65	20.7	20.7	20.7	A) × T2 20.68	20.5		,	0.46	
(92)m= 19 Apply ad (93)m= 19	iustment to	20.19 he mean 20.19	20.52 interna 20.52	20.65 tempera	20.7 ature fro	20.7 om Table	20.7 • 4e, whe	-A) × T2 20.68 ere appro	20.5 opriate	20.06	19.6	0.46	(92)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to	9.59 19.85 justment to 1 9.59 19.85 heating req the mean in	20.19 he mean 20.19 uirement ternal ter	20.52 interna 20.52 nperatu	20.65 tempera 20.65 re obtain	20.7 ature fro 20.7	20.7 om Table 20.7	20.7 20.7 20.7 20.7	A) × T2 20.68 ere appro 20.68	20.5 opriate 20.5	20.06	19.6 19.6		(92)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisa	9.59 19.85 justment to 1 9.59 19.85 heating req the mean in ation factor f	20.19 he mean 20.19 uirement ternal ter or gains	20.52 interna 20.52 mperatur using Ta	20.65 tempera 20.65 re obtain able 9a	20.7 ature fro 20.7 ed at st	20.7 pm Table 20.7 cep 11 of	20.7 20.7 20.7 20.7 Table 9	A) × T2 20.68 20.68 20.68 b, so tha	20.5 opriate 20.5 t Ti,m=(20.06 20.06 76)m an	19.6 19.6 d re-calc		(92)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisa	9.5919.85justment to0.5919.85heating reqthe mean ination factor fanFeb	20.19 he mean 20.19 uirement ternal ter or gains Mar	20.52 interna 20.52 mperatur using Ta Apr	20.65 tempera 20.65 re obtain	20.7 ature fro 20.7	20.7 om Table 20.7	20.7 20.7 20.7 20.7	A) × T2 20.68 ere appro 20.68	20.5 opriate 20.5	20.06	19.6 19.6		(92)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisat Utilisation	9.5919.85justment to9.5919.85heating reqthe mean ination factor fanFebn factor for g	20.19 the mean 20.19 uirement ternal ter or gains Mar jains, hm	20.52 interna 20.52 mperatur using Ta Apr :	20.65 tempera 20.65 re obtain able 9a May	20.7 ature fro 20.7 hed at st	20.7 pm Table 20.7 cep 11 of Jul	20.7 20.7 20.7 Table 9 Aug	A) × T2 20.68 20.68 20.68 b, so tha Sep	20.5 ppriate 20.5 t Ti,m=(Oct	20.06 20.06 76)m an Nov	19.6 19.6 d re-calc Dec		(92) (93)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0	9.5919.85justment to0.5919.85heating reqthe mean in ation factor fanFebn factor for g0.90.85	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77	20.52 interna 20.52 mperatur using Ta Apr : 0.63	20.65 I tempera 20.65 re obtain able 9a May 0.47	20.7 ature fro 20.7 ed at st	20.7 pm Table 20.7 cep 11 of	20.7 20.7 20.7 20.7 Table 9	A) × T2 20.68 20.68 20.68 b, so tha	20.5 opriate 20.5 t Ti,m=(20.06 20.06 76)m an	19.6 19.6 d re-calc		(92)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga	9.5919.85justment to 1justment to 1justment to 1justment to 1heating reqheating reqthe mean ination factor fanFebn factor for g0.90.85ains, hmGm	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77	20.52 interna 20.52 mperatur using Ta Apr : 0.63	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m	20.7 ature fro 20.7 eed at st Jun 0.32	20.7 pm Table 20.7 cep 11 of Jul	20.7 20.7 20.7 Table 9 Aug 0.25	A) × T2 20.68 20.68 20.68 b, so tha Sep	20.5 ppriate 20.5 t Ti,m=(Oct	20.06 20.06 76)m an Nov 0.84	19.6 19.6 d re-calc Dec 0.91		(92) (93)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34	9.59 19.85 justment to 1 19.85 heating req 19.85 an Feb n factor for g 0.85 ains, hmGm 19.8 19.8 375.48	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , W = (94 384.46	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55	20.7 ature fro 20.7 eed at st Jun 0.32 188.84	20.7 20.7	20.7 20.7 20.7 Table 9 Aug	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43	20.5 ppriate 20.5 t Ti,m=(Oct 0.69	20.06 20.06 76)m an Nov	19.6 19.6 d re-calc Dec		(92) (93) (94)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a	9.5919.85justment to 1justment to 1justment to 1justment to 1heating reqheating reqthe mean ination factor fanFebn factor for g0.90.85ains, hmGm	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , W = (94 384.46	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55	20.7 ature fro 20.7 eed at st Jun 0.32 188.84	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43	20.5 ppriate 20.5 t Ti,m=(Oct 0.69	20.06 20.06 76)m an Nov 0.84	19.6 19.6 d re-calc Dec 0.91		(92) (93) (94)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a (96)m= 4	9.5919.85justment to0.5919.85heating reqthe mean in factor factor for 0.90.85ains, hmGm19.8375.48average external	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , $W = (9^2)^2$ 384.46 ernal tem 6.5	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9	20.65 I tempera 20.65 Te obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7	20.7 ature fro 20.7 eed at st Jun 0.32 188.84 able 8 14.6	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43 204.93	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6	20.06 20.06 76)m an Nov 0.84 322.03	19.6 19.6 d re-calc Dec 0.91 337.15		(92) (93) (94) (95)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a (96)m= 4 Heat loss	9.5919.85justment to0.5919.85heating reqthe mean in ation factor fanFebn factor for g0.90.85ains, hmGm19.8375.48average exte.34.9	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , $W = (9^2)^2$ 384.46 ernal tem 6.5	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9	20.65 I tempera 20.65 Te obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7	20.7 ature fro 20.7 eed at st Jun 0.32 188.84 able 8 14.6	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43 204.93	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6	20.06 20.06 76)m an Nov 0.84 322.03	19.6 19.6 d re-calc Dec 0.91 337.15		(92) (93) (94) (95)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a (96)m= 4 Heat loss (97)m= 53	9.5919.85justment to 10.5919.85heating reqthe mean in factor fanFebn factor for g0.90.85ains, hmGm19.8375.48average extra.34.9s rate for me	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , $W = (94)$ 384.46 ernal tem 6.5 an intern 470.88	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9 al tempe 382.6	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7 erature, 291.87	20.7 ature fro 20.7 eed at st Jun 0.32 188.84 able 8 14.6 Lm , W 189.95	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53 16.4 x [(93)m 132.83	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43 204.93 14.1 – (96)m 208.79	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6] 322.96	20.06 20.06 76)m an Nov 0.84 322.03 7.1 430.48	19.6 19.6 d re-calc Dec 0.91 337.15 4.2		(92) (93) (94) (95) (96)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a (96)m= 4 Heat loss (97)m= 53 Space he	9.59 19.85 justment to 1 19.85 justment to 1 19.85 heating req 19.85 an Feb n factor for g 0.85 ains, hmGm 19.8 19.8 375.48 average exter 4.9 s rate for me 4.68 518.47	20.19 he mean 20.19 uirement ternal ter or gains Mar jains, hm 0.77 , $W = (94)$ 384.46 ernal tem 6.5 an intern 470.88	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9 al tempe 382.6	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7 erature, 291.87	20.7 ature fro 20.7 eed at st Jun 0.32 188.84 able 8 14.6 Lm , W 189.95	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53 16.4 x [(93)m 132.83	A) × T2 20.68 20.68 20.68 b, so tha Sep 0.43 204.93 14.1 – (96)m 208.79	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6] 322.96	20.06 20.06 76)m an Nov 0.84 322.03 7.1 430.48	19.6 19.6 d re-calc Dec 0.91 337.15 4.2		(92) (93) (94) (95) (96)
(92)m= 19 Apply ad (93)m= 19 8. Space Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 34 Monthly a (96)m= 4 Heat loss (97)m= 53 Space he	9.5919.85justment to0.5919.85heating reqthe mean in factor fanFebn factor for g0.90.85ains, hmGm19.8375.48average exter1.34.9s rate for me4.68518.47eating requir	20.19 the mean 20.19 uirement ternal ter or gains Mar ains, hm 0.77 , W = (94 384.46 ernal tem 6.5 an intern 470.88 ement fo	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9 al tempe 382.6 r each n	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7 erature, 1 291.87 nonth, k\	20.7 ature fro 20.7 ed at st Jun 0.32 188.84 188.84 14.6 Lm , W 189.95 Wh/mon	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53 16.4 x [(93)m 132.83 24 x [(97 0	A) × T2 20.68 20.68 b, so tha Sep 0.43 204.93 14.1 - (96)m 208.79)m - (95	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6] 322.96)m] x (4' 26.17	20.06 20.06 76)m an Nov 0.84 322.03 7.1 430.48 1)m 78.08	19.6 19.6 d re-calc Dec 0.91 337.15 4.2 520.47 136.39		(92) (93) (94) (95) (96)
(92)m = 19 Apply ad $(93)m = 19$ 8. Space Set Ti to the utilisation $(94)m = 0$ Useful ga $(95)m = 34$ Monthly a $(96)m = 4$ Heat loss $(97)m = 53$ Space he $(98)m = 13$	9.5919.85justment to0.5919.85heating reqthe mean in factor fanFebn factor for g0.90.85ains, hmGm19.8375.48average exter1.34.9s rate for me4.68518.47eating requir	20.19 he mean 20.19 uirement ternal ternor gains Mar ains, hm 0.77 , $W = (94)$ 384.46 ernal tem 6.5 an internal 470.88 ement fo 64.3	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9 al tempe 382.6 r each n 22.15	20.65 I tempera 20.65 re obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7 erature, 291.87 nonth, k\ 6.19	20.7 ature fro 20.7 ed at st Jun 0.32 188.84 188.84 14.6 Lm , W 189.95 Wh/mon	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53 16.4 x [(93)m 132.83 24 x [(97 0	A) × T2 20.68 20.68 b, so tha Sep 0.43 204.93 14.1 - (96)m 208.79)m - (95 0	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6] 322.96)m] x (4' 26.17	20.06 20.06 76)m an Nov 0.84 322.03 7.1 430.48 1)m 78.08	19.6 19.6 d re-calc Dec 0.91 337.15 4.2 520.47 136.39	culate	(92) (93) (94) (95) (96) (97)
(92)m = 19 Apply ad $(93)m = 19$ 8. Space Set Ti to the utilisation $(94)m = 0$ Useful ga $(95)m = 34$ Monthly a $(96)m = 4$ Heat loss $(97)m = 53$ Space he $(98)m = 13$	0.5919.85justment to 10.5919.85heating reqthe mean in ation factor fanFebn factor for g0.90.85ains, hmGm19.8375.48average exte4.34.9s rate for me4.68518.47eating requir7.5596.09	20.19he mean20.19uirementternal ternor gainsMarjains, hm0.77, W = (94)384.46ernal tem6.5an intern470.88ement fo64.3ement in	20.52 interna 20.52 mperatur using Ta Apr : 0.63 4)m x (8- 351.84 perature 8.9 al tempe 382.6 r each n 22.15	20.65 I tempera 20.65 Te obtain able 9a May 0.47 4)m 283.55 e from Ta 11.7 erature, 1 291.87 nonth, kV 6.19	20.7 ature fro 20.7 eed at st Jun 0.32 188.84 able 8 14.6 Lm , W 189.95 Wh/mon 0	20.7 20.7	20.7 20.7 20.7 Table 9 Aug 0.25 132.53 16.4 x [(93)m 132.83 24 x [(97 0	A) × T2 20.68 20.68 b, so tha Sep 0.43 204.93 14.1 - (96)m 208.79)m - (95 0	20.5 ppriate 20.5 t Ti,m=(Oct 0.69 287.79 10.6] 322.96)m] x (4' 26.17	20.06 20.06 76)m an Nov 0.84 322.03 7.1 430.48 1)m 78.08	19.6 19.6 d re-calc Dec 0.91 337.15 4.2 520.47 136.39	culate	(92) (93) (94) (95) (96) (97) (98)

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 (Tab	ole 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 allow includes boilers, heat pumps, geothermal and waste heat from power stations. See		four other heat sources;	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 boilers		(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	/ heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system			1.05	(306)
Space heating Annual space heating requirement			kWh/yea 566.92	r
Space heat from Community boilers	(98) x (304a) x	x (305) x (306) =	238.1	(307a)
Space heat from heat source 2	(98) x (304b) x	x (305) x (306) =	238.1	(307b)
Efficiency of secondary/supplementary heating system in % (from 7	Fable 4a or Apper	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x ⁻	100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			1859.72	7
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	x (305) x (306) =	781.08	(310a)
Water heat from heat source 2	(64) x (303b) x	x (305) x (306) =	781.08	(310b)
Electricity used for heat distribution	0.01 × [(307a)(307	7e) + (310a)(310e)] =	20.38	(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 out	side		195.54	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	195.54	(331)
Energy for lighting (calculated in Appendix L)			254.88	(332)
Electricity generated by PVs (Appendix M) (negative quantity)			-522.64	(333)
Electricity generated by wind turbine (Appendix M) (negative quant	ity)		0	(334)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two	o fuels repeat (363) to	(366) for the second fue	el 89	(367a)
Efficiency of heat source 2 (%) If there is CHP using two	o fuels repeat (363) to	(366) for the second fue	el 89	(367b)

CO2 associated with heat source 1	[(307b)	+(310b)] x 100 ÷ (367b) x	0.22	=	247.35	(367)
CO2 associated with heat source 2	[(307b)	+(310b)] x 100 ÷ (367b) x	0.22	=	247.35	(368)
Electrical energy for heat distribution		[(313) x	0.52	=	10.58	(372)
Total CO2 associated with community sy	vstems	(363)(366) + (368)(372	2)	=	505.28	(373)
CO2 associated with space heating (sec	ondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersi	on heater or instantar	eous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and wa	ater heating	(373) + (374) + (375) =			505.28	(376)
CO2 associated with electricity for pump	s and fans within dwe	lling (331)) x	0.52	=	101.49	(378)
CO2 associated with electricity for lightin	g	(332))) x	0.52	=	132.28	(379)
Energy saving/generation technologies (333) to (334) as appli	cable				
Item 1			0.52 × 0.0	01 =	-271.25	(380)
Total CO2, kg/year	sum of (376)(382) =				467.8	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				8.73	(384)
El rating (section 14)					93.64	(385)

			User D	etails:							
Assessor Name: Software Name:	John Ashe Stroma FSAP 2	2012		Strom Softwa					0031268 on: 1.0.5.8		
		P	roperty A	Address:	Unit 31	- COPF	PETTS V	VOOD, L	ondon		
Address :											
1. Overall dwelling dim	ensions:										
Ground floor				a(m²) 3.56	(1a) x		ight(m) 66	(2a) =	Volume(m ³) 142.47	(3a)	
Total floor area TFA = (*	la)+(1b)+(1c)+(1d)+	·(1e)+(1n) 5	3.56	(4)			_		_	
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	142.47	(5)	
2. Ventilation rate:											
	main heating	secondar heating	у	other		total			m ³ per hou	•	
Number of chimneys	0 +		+	0	=	0	X ·	40 =	0	(6a)	
Number of open flues	0 +	0	ī + [0	- = [0	x	20 =	0	(6b)	
Number of intermittent fa	ans					2	×	10 =	20	(7a)	
Number of passive vent	S				Ē	0	x	10 =	0	(7b)	
Number of flueless gas	fires				Γ	0	x -	40 =	0	(7c)	
								Air ch	anges per ho	_ ur	
Infiltration due to chimne	we flues and fans -	- (62)+(6b)+(7	a)+(7b)+(3	7c) -	Г					_	
If a pressurisation test has	•				continue fr	20 om (9) to (÷ (5) =	0.14	(8)	
Number of storeys in						(-/ (()		0	(9)	
Additional infiltration							[(9)	-1]x0.1 =	0	(10)	
Structural infiltration: (0.25 for steel or time	per frame or	0.35 for	masonr	y constr	uction			0	(11)	
if both types of wall are deducting areas of open		prresponding to	the greate	er wall are	a (after						
If suspended wooden	floor, enter 0.2 (uns	sealed) or 0.	1 (seale	d), else	enter 0				0	(12)	
lf no draught lobby, er	nter 0.05, else enter	0							0	(13)	
Percentage of window	s and doors draugh	nt stripped							0	(14)	
Window infiltration				0.25 - [0.2					0	(15)	
Infiltration rate				(8) + (10)					0	(16)	
Air permeability value			•			etre of e	envelope	area	5	(17)	
If based on air permeab Air permeability value appli	•					ia haina u	and		0.39	(18)	
Number of sides shelter		l nas been don	e or a deg	liee all pei	meaning	is being u	seu		0	(19)	
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			1	(10)	
Infiltration rate incorpora	iting shelter factor			(21) = (18)) x (20) =				0.39	(21)	
Infiltration rate modified	for monthly wind sp	eed									
Jan Feb	Mar Apr M	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Monthly average wind s	peed from Table 7										
(22)m= 5.1 5	4.9 4.4 4.3	3 3.8	3.8	3.7	4	4.3	4.5	4.7			
Wind Factor (22a)m = (2	22)m ÷ 4										
(22a)m= 1.27 1.25	1.23 1.1 1.0	8 0.95	0.95	0.92	1	1.08	1.12	1.18			

Adjuste	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	: (21a) x	(22a)m				_	
	0.5	0.49	0.48	0.43	0.42	0.37	0.37	0.36	0.39	0.42	0.44	0.46		
			-	rate for t	he appli	cable ca	se					-	- 	
		al ventila			~ ~ ~ ~	/			. (22)) (22)			0	(23a)
			• • •		, ,	, ,		N5)) , othe) = (23a)			0	(23b)
lf bala	anced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fror	n Table 4h) =				0	(23c)
a) If	balance	d mecha	anical ve	entilation	with hea	at recove	ery (MV	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	d mecha	anical ve	entilation	without	heat rec	overy (I	MV) (24b)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	tilation o	or positiv	e input v	ventilatio	on from a	outside		-	-		
i	f (22b)n	n < 0.5 ×	(23b), t	hen (240	c) = (23b); otherv	wise (24	c) = (22k	o) m + 0.	5 × (23b)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,					•	•		on from l					-	
i	f (22b)n	n = 1, the	en (24d)	m = (22l	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	ld) in boy	k (25)			-		
(25)m=	0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(25)
3 He	at losse	s and he	at loss i	paramete	ər.									
						Net Ar	ea	U-valı	le	AXU		k-value	2	AXk
	LEMENT Gross Openings Net Area U-value A X U k-value area (m ²) m ² A ,m ² W/m2K (W/K) kJ/m ² ·													kJ/K
Windo	WS					8.95	x1	/[1/(1.4)+	0.04] =	11.87				(27)
Walls		27.4	3	8.95	;	18.48	3 X	0.18] = [3.33	Ξ Γ			(29)
Total a	rea of e	lements	, m²			27.43	3	L	'					(31)
				effective wi	ndow U-va	alue calcul	ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
				nternal wal			-				-			
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)) + (32) =				15.19) (33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	1108.	8 (34)
Therm	al mass	parame	ter (TMF	^o = Cm ÷	- TFA) ir	∩ kJ/m²K			Indica	tive Value	: Medium		250	(35)
	-				construct	ion are noi	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
		ad of a dea		culated u		nondiv l								
	-			own (36) =		-	1						1.37	(36)
	abric he			0001 (30) -	- 0.00 x (0	")			(33) +	(36) =			16.56	3 (37)
			alculated	monthly	V					= 0.33 × (25)m x (5))	10.00	, (0.)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(38)m=	29.33	29.11	28.88	27.84	27.65	26.74	26.74	26.57	27.09	27.65	28.04	28.45		(38)
	onofor (L								20)m		I	
	45.89	coefficier 45.67	11, VV/K 45.45	44.41	44.21	43.3	43.3	43.14	43.65	= (37) + (3	44.6	45.02	1	
(39)m=	40.09	43.07	45.45	44.41	44.21	43.3	43.3	43.14		Average =			44.4	(39)
Heat lo	oss para	meter (H	HLP), W	′m²K						= (39)m ÷		12 / 12=	44.4	(00)
(40)m=	0.86	0.85	0.85	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84		
		I	I				1	<u>I</u>	<u>ا</u> ــــــــــــــــــــــــــــــــــــ	Average =	un(40)₁	₁₂ /12=	0.83	(40)
Numbe	er of day	/s in moi	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
(41)11-	01	20	01	00	01				00	01		01		()
4. Wat	ter heati	ina ener	gy requi	rement:								kWh/ye	ear:	
		Ŭ												
), N = 1		[1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (⁻	ΓFA -13.		.8		(42)
Annual	average	e hot wa			•		•	(25 x N) to achieve		se target o		5.83		(43)
		-	person per			-	-			0				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	r usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	84.52	81.44	78.37	75.3	72.22	69.15	69.15	72.22	75.3	78.37	81.44	84.52		_
Energy co	ontent of l	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D)Tm / 3600		Total = Su hth (see Ta	· · ·		921.99	(44)
(45)m=	125.33	109.62	113.12	98.62	94.63	81.66	75.67	86.83	87.86	102.4	111.77	121.38		
If instanta	aneous wa	ater heatir	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46,		Total = Su	m(45) ₁₁₂ =	=	1208.88	(45)
(46)m=	18.8	16.44	16.97	14.79	14.19	12.25	11.35	13.02	13.18	15.36	16.77	18.21		(46)
Water s	-										·		1	
-		. ,					-	within sa	ame ves	sei		150		(47)
	•	-	nd no ta hot wate		-			(47) mbi boil	ers) ente	er '0' in (47)			
Water s			not mate			notantai					,			
a) If ma	anufactu	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temper	rature fa	actor fro	m Table	2b							0.	54		(49)
•••			storage					(48) x (49)) =		0.	75		(50)
,			eclared of factor fr									0	l	(51)
		•	ee secti		6 Z (KVV	1/1116/06	(y)					0		(31)
Volume	•	-										0		(52)
Temper	rature fa	actor fro	m Table	2b								0		(53)
Energy	lost from	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) in (5	55)								0.	75		(55)
Water s	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(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		(56)
If cylinder	r contains	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	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)
Primary	/ circuit	loss (an	inual) fro	om Table	e 3							0		(58)
•						,	. ,	65 × (41)						
(mod		factor fr	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi I	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total he	eat requ	ired for	water he		alculated	i	i	· /	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	I
(62)m=	171.93	151.7	159.71	143.71	141.22	126.75	122.26	133.42	132.96	148.99	156.87	167.97		(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)																	
(add addition	al lines if	FGHRS	S ai	nd/or V	VWHR	S ap	plies	, see Ap	pend	dix G	3)		_				
(63)m= 0	0	0		0	0		0	0	C)	0	0	0	()		(63)
Output from	water hea	ter											-				
(64)m= 171.93	3 151.7	159.71	1	143.71	141.22	1:	26.75	122.26	133	.42	132.96	148.99	9 156.87	167	7.97		_
										Outp	out from wa	ter hea	ter (annual)₁	12		1757.49	(64)
Heat gains fr	om water	heating	<u>, k</u>	Wh/mc	onth 0.2	<u>25 ′</u>	[0.85	× (45)m	+ (6	61)m] + 0.8 x	[(46)r	n + (57)m	+ (5	i9)m]	
(65)m= 78.95	70.12	74.89		68.86	68.74	6	3.22	62.43	66.	15	65.29	71.32	73.24	77	.63		(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	A	ug	Sep	Oct	Nov	D	ec		
<mark>(66)</mark> m= 89.75	89.75	89.75		89.75	89.75	8	9.75	89.75	89.	75	89.75	89.75	89.75	89	.75		(66)
Lighting gain	s (calcula	ted in A	рр	endix L	_, equa	tion	L9 o	r L9a), a	lso s	see 7	Table 5					_	
(67)m= 14.43	12.82	10.42		7.89	5.9	4	4.98	5.38	7	7	9.39	11.92	13.91	14	.83		(67)
Appliances g	ains (calc	ulated i	n A	Append	lix L, eo	quat	tion L	13 or L1	3a),	also	see Tab	ole 5					
(68)m= 156.4	7 158.09	154	1	145.29	134.29	1:	23.96	117.06	115	.43	119.52	128.23	3 139.23	149	9.56		(68)
Cooking gair	ns (calcula	ated in A	٩p	pendix	L, equa	atior	า L15	or L15a)	, als	io se	e Table	5					
(69)m= 31.98	31.98	31.98		31.98	31.98	3	1.98	31.98	31.	98	31.98	31.98	31.98	31	.98		(69)
Pumps and f	ans gains	(Table	5a	.)									•				
(70)m= 3	3	3	Τ	3	3		3	3	3	3	3	3	3	:	3		(70)
Losses e.g. e	evaporatio	n (nega	ativ	ve value	es) (Ta	ble	5)						•				
(71)m= -71.8	-71.8	-71.8	Т	-71.8	-71.8	-	71.8	-71.8	-71	1.8	-71.8	-71.8	-71.8	-7'	1.8		(71)
Water heatin	g gains (T	Table 5)				1								•		1	
(72)m= 106.12	2 104.34	100.65		95.64	92.39	8	87.81	83.92	88.	91	90.68	95.86	101.72	104	.35		(72)
Total interna	al gains =	:					(66)	m + (67)m	ı + (68	3)m +	- (69)m + (7	70)m +	(71)m + (72)	m		1	
(73)m= 329.94	4 328.18	318	3	301.75	285.51	20	69.68	259.28	264	.26	272.52	288.95	5 307.79	321	.67		(73)
6. Solar gai	ns:	1															
Solar gains are	e calculated	using sol	ar fl	lux from	Table 6a	and	associ	ated equa	tions	to co	nvert to the	e applic	able orientat	ion.			
Orientation:				Area			Flu			_	g		FF			Gains	
	Table 6d			m²			Tal	ole 6a		Т	able 6b		Table 6c			(W)	
West 0.9x	0.77)	(8.9	5	x	1	9.64	x		0.63	x	0.7		=	53.72	(80)
West 0.9x	0.77)	۰ [8.9	5	x	3	8.42	x		0.63	×	0.7		=	105.09	(80)
West 0.9x	0.77)	<u>،</u> [8.9	5	x	6	3.27	x		0.63	x	0.7		=	173.07	(80)
West 0.9x	0.77)	< [8.9	5	x	9	2.28	x		0.63	x	0.7		=	252.41	(80)
West 0.9x	0.77	>	۰ [8.9	5	x	1	13.09	x		0.63	x	0.7		=	309.34	(80)
West 0.9x	Nest 0.9x 0.77 x 8.95					x	1	15.77	x		0.63	×	0.7		=	316.66	(80)
West 0.9x	West 0.9x 0.77 × 8.95						1	10.22	x		0.63	×	0.7		=	301.47	(80)
West 0.9x					5	x	9	4.68	x		0.63	- ×	0.7		=	258.96	(80)
West 0.9x 0.77 x 8.95					5	x	7	3.59	x		0.63	- ×	0.7		=	201.28	(80)
West 0.9x 0.77 x 8.95							4	5.59	x		0.63	×	0.7		=	124.7	(80)
	B.								•								

West	0.9x	0.77	x	8.	95	x	2	24.49	x 🗌	0.63	x	0.7	=	66.98	(80)
West	0.9x	0.77	x	8.	95	x	1	6.15) x [0.63	x	0.7	=	44.18	(80)
	_														
Solar g	gains in	watts, ca	alculated	d for eac	h month	ו		-	(83)m =	Sum(74)m	(82)m	-	-		
(83)m=	53.72	105.09	173.07	252.41	309.34	3	16.66	301.47	258.96	201.28	124.7	66.98	44.18		(83)
Total g	jains – i	nternal a	nd sola	r (84)m	= (73)m	+ (83)m	, watts	-		•	•			
(84)m=	383.66	433.26	491.07	554.16	594.85	5	86.34	560.75	523.22	473.8	413.64	374.77	365.85		(84)
7. Me	an inter	nal temp	perature	(heating	a seasor	า)		-			-				
		during h					area	from Tab	ole 9. T	h1 (°C)				21	(85)
		ctor for g	• •			-									
Otmot	Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.96	0.85	0.67	+	0.47	0.34	0.38	0.62	0.91	0.99	1		(86)
						_				1	0.01	0.00			()
	-	l temper	i	т <u> </u>	1			i	1	- <u>'</u>			i	I	
(87)m=	20.29	20.43	20.65	20.88	20.98		21	21	21	20.99	20.84	20.53	20.27		(87)
Temp	erature	during h	neating p	periods i	n rest of	f dw	elling	from Ta	able 9,	Th2 (°C)					
(88)m=	20.2	20.21	20.21	20.23	20.23	2	20.25	20.25	20.25	20.24	20.23	20.22	20.22		(88)
l Itilis:	ation fac	ctor for g	ains for	rest of c	welling	h2	m (se	Pe Table	9a)	-		•			
(89)m=	0.99	0.98	0.95	0.82	0.62	-	0.42	0.28	0.32	0.56	0.88	0.98	0.99		(89)
		ļ				_									
		i	i	1	1	<u> </u>		-	ri	7 in Tab	<u>, </u>	1	1	I	
(90)m=	19.26	19.46	19.78	20.1	20.21	2	20.24	20.25	20.25	20.23	20.06	19.63	19.25		(90)
											fLA = Livir	ng area ÷ (4	4) =	0.46	(91)
Mean	interna	l temper	ature (fo	or the wl	nole dwe	ellin	g) = f	LA × T1	+ (1 –	LA) × T2					
(92)m=	19.73	19.91	20.18	20.46	20.57	2	20.59	20.6	20.6	20.58	20.43	20.05	19.72		(92)
Apply	adjustr	nent to t	he meai	n interna	l tempe	ratu	ure fro	m Table	4e, wl	nere appro	opriate				
(93)m=	19.73	19.91	20.18	20.46	20.57	2	20.59	20.6	20.6	20.58	20.43	20.05	19.72		(93)
8. Sp	ace hea	ting requ	uiremen	t	•										
Set T	i to the	mean int	ernal te	mperatu	ire obtai	nec	l at st	ep 11 of	Table	9b, so tha	at Ti,m=(76)m an	d re-calc	ulate	
the ut	tilisation	factor fo	or gains	using T	able 9a									I	
	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		tor for g	i	1										I	
(94)m=	0.99	0.98	0.94	0.83	0.64		0.44	0.31	0.35	0.59	0.89	0.98	0.99		(94)
Usefu		hmGm	i Š	r Ò	T									l	
(95)m=	380.16	424.64	463.91	461.48	383.17		58.97	172.98	180.95	279.33	367.66	366.76	363.24		(95)
	<u> </u>	age exte	i	r –	e from T	-					r			l	
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		i	i	· · · ·	1	_		<u> </u>	î <u>, ,</u>	n– (96)m	ŕ			I	
(97)m=	708.36	685.58	621.84	513.42	392.04		59.58	173.02	181.04		434.4	577.59	698.72		(97)
		ř ·	i	1	nonth, k	Wh	n/mon	th = 0.02	24 x [(9	7)m – (95	í - · ·	r í		l	
(98)m=	(98)m= 244.18 175.35 117.5 37.39 6.6 0 0 0 0 49.66 151.8 249.6														
									Тс	tal per year	(kWh/yea	r) = Sum(9	8)15,912 =	1032.08	(98)
Space	e heatin	g require	ement ir	kWh/m	²/year									19.27	(99)
•		quiremer			•	svst	ems i	ncluding	micro	CHP)					
	e heatii		IIIU	- Hardar I	iouting t	5901	orno I	Hordding	-inici o						
-		-	at from s	econda	ry/supple	eme	entarv	system						0	(201)
	Fraction of space heat from secondary/supplementary system											5			

Fraction of space heat from main system(s) $(202) = 1 - (201) =$													1	(202)
Fracti	on of to	tal heati	ng from	main sys	stem 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Efficie	ency of I	main spa	ace heat	ting syste	em 1								93.5	(206)
Efficie	ency of	seconda	ry/suppl	ementar	y heating	g system	า, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	e heatin	g require	ement (o	calculate	d above)		1			i i i i i i i i i i i i i i i i i i i	1	-		
	244.18	175.35	117.5	37.39	6.6	0	0	0	0	49.66	151.8	249.6		
(211)m	n = {[(98	<u> </u>	04)] } x ′	100 ÷ (20)6)								1	(211)
	261.16	187.54	125.67	39.99	7.06	0	0	0	0	53.11	162.36	266.95		-
= {[(98)m x (20	01)]}x1	00 ÷ (20	T .	· · · · ·					ar) =Sum(2			1103.83	(211)
(215)m=	0	0	0	0	0	0	0	0 Tota	0	0 ar) =Sum(2	0	0		
Matar	heating							TOLA	i (Kvvii/yea	ar) =5um(2	213) _{15,1012}	2=	0	(215)
	heating		ter (calc	ulated a	bove)									
•p	171.93	151.7	159.71	143.71	141.22	126.75	122.26	133.42	132.96	148.99	156.87	167.97		
Efficier	ncy of w	ater hea	ater										79.8	(216)
(217)m=	85.75	85.2	84.01	81.8	80.22	79.8	79.8	79.8	79.8	82.23	84.73	85.87		(217)
		heating,												
(219)fr (219)m=		<u>m x 100</u> 178.05) ÷ (217 190.11)m 175.69	176.03	158.83	153.21	167.2	166.61	181.19	185.14	195.62]	
			1	1				Tota	l = Sum(2	19a) ₁₁₂ =			2128.19	(219)
Annua	I totals									k	Wh/year	r	kWh/year	_
Space	heating	fuel use	ed, main	system	1								1103.83	
Water	heating	fuel use	ed										2128.19]
Electri	city for p	oumps, f	ans and	electric	keep-ho	t								_
centra	al heatir	ng pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45]	(230e)
Total e	electricit	y for the	above,	kWh/yea	r			sum	of (230a).	(230g) =		L	75	(231)
Electri	city for l	ighting											254.88	(232)
12a. (CO2 em	issions ·	– Indivic	lual heat	ing syste	ems inclu	uding mi	cro-CHP						_
							e rgy /h/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ar
Space	heating	(main s	system 1)		(21	1) x			0.2	16	=	238.43	(261)
Space	heating	(second	dary)			(21	5) x			0.5	19	=	0	(263)
Water	heating					(219	9) x			0.2	16	=	459.69	(264)
Space	and wa	ter heati	ing			(261	1) + (262) ·	+ (263) + (264) =				698.12	(265)
Electri	city for p	oumps, f	ans and	electric	keep-ho	t (23 ⁻	1) x			0.5	19	=	38.93	(267)
Electri	city for I	ighting				(232	2) x			0.5	19	=	132.28	(268)

Total CO2, kg/year

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

869.32 (272)

TER =

L

16.23 (273)

SAP 2012 Overheating Assessment

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

Property Details: Unit 31 - COPPETTS WOOD, London

Dwelling type: Located in: Region: Cross ventilation pos Number of storeys: Front of dwelling face Overshading: Overhangs: Thermal mass param Night ventilation: Blinds, curtains, shut Ventilation rate durin	es: eter: :ters:	ther (a	ich):	Flat England Thames valley Yes 1 North Average or unknown None Indicative Value Low False 4 (Windows open half the time)										
Summer ventilation h Transmission heat lo Summer heat loss co	ss coeffic		ent:	188.06 14.7 202.72				(P1) (P2)						
Overhangs:														
Orientation:	Ratio:		Z_overhangs:											
West (Left Windows)	0		- C											
Solar shading:														
Orientation: West (Left Windows) Solar gains:	Z blinds 1	6:	Solar access: 0.9	Overh 1	nangs:	Z summer: 0.9		(P8)						
Orientation West (Left Windows)	0.9 x	Area 8.95	Flux 117.51	g_ 0.63	FF 0.7	Shading 0.9 Total	Gains 375.67 375.67	(P3/P4)						
Internal gains:														
Internal gains Total summer gains Summer gain/loss ratic Mean summer external Thermal mass tempera Threshold temperature Likelihood of high int	temperati ture increr	ment		Jun 378 776 3.83 16 1.3 21.7 Slig	.08 .87 3	July 364.88 740.56 3.65 17.9 1.3 22.85 Medium	August 371.48 701.99 3.46 17.8 1.3 22.56 Medium	(P5) (P6) (P7)						
Assessment of likelih	ood of hi	gh inte	ernal temperatur	'е: <u>Мес</u>	<u>dium</u>									