Regulations Compliance Report

	ent L1A, 2013 Edition e 2023 at 14:55:41	, England assessed by St	roma FSAP 2012 program, Ve	rsion: 1.0.5.17
Project Information				
Assessed By:	Ben Talbutt (STRC	0036639)	Building Type:	Flat
Dwelling Details:				
NEW DWELLING			Total Floor Area: 9	00.73m ²
Site Reference :	Fosters Estate Blo	ck D	Plot Reference:	D2-04
Address :				
Client Details:				
Name: Address :				
•	rs items included wi ete report of regulati	thin the SAP calculation ons compliance.	IS.	
1a TER and DEF	R			
	ing system: Electricit	y (c)		
Fuel factor: 1.55 (e	electricity (c)) oxide Emission Rate (25.01 kg/m²	
-	Dioxide Emission Rate		10.71 kg/m ²	ОК
1b TFEE and DF			10.7 1 Kg/m	
Target Fabric Ene	rgy Efficiency (TFEE))	50.4 kWh/m ²	
Dwelling Fabric Er	nergy Efficiency (DFE	E)	44.8 kWh/m ²	
2 Fabric U-value	S			ОК
Element		Average	Highest	
External	wall	0.16 (max. 0.30)	0.20 (max. 0.70)	ОК
Party wal	I	0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof Openings		0.20 (max. 0.20) 1.33 (max. 2.00)	0.20 (max. 0.35) 1.40 (max. 3.30)	OK OK
2a Thermal brid		1.55 (max. 2.00)	1.40 (IIIax. 5.50)	UK
		om linear thermal transmi	ttances for each junction	
3 Air permeabili				
	bility at 50 pascals		3.00 (design val 10.0	ue) OK
			10.0	UK
4 Heating efficie				
Main Heatir	ng system:	Community heating sch	emes - Heat pump	
Secondary	heating system:	None		
5 Cylinder insul	ation			
Hot water S	Storage:	No cylinder		
6 Controls				
Space heat	ing controls		to use of community heating,	0//
Hot water c	ontrols:	programmer and at leas No cylinder thermostat No cylinder		OK

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.61	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Not assessed	?
10 Key features		
Air permeablility	3.0 m³/m²h	
Doors U-value	0.91 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.1 W/m²K	
Community heating, heat from electric heat pump		



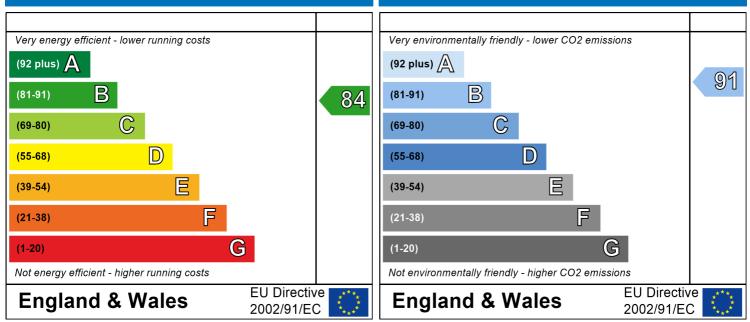
Dwelling type: Date of assessment: Produced by: Total floor area: Mid floor Flat 13 October 2022 Ben Talbutt 90.73 m²

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.

SAP Input

Property Details: D2-04

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	13 October 2022
Date of certificate:	16 June 2023
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/da	ay: True
PCDF Version:	505

Property description:

Dwelling type:	Flat	
Detachment: Year Completed:	2022	
Floor Location:	Floor area:	
		Storey height:
Floor 0	90.73 m ²	2.62 m
Living area: Front of dwelling faces:	28.49 m ² (fraction 0.314) Unspecified	

Opening types:

Opening types:						
Name:	Source:	Туре:	Glazing:		Argon:	Frame:
Front Door	Manufacturer	Solid				Wood
Win 1	Manufacturer	Windows		0.05, soft coat	No	
Win 2	Manufacturer	Windows		0.05, soft coat	No	
Win 3	Manufacturer	Windows		0.05, soft coat	No	
Win 4	Manufacturer	Windows		0.05, soft coat	No	
Win 5	Manufacturer	Windows		0.05, soft coat	No	
Win 6	Manufacturer	Windows	low-E, En =	0.05, soft coat	No	
Name:	Gap:	Frame Fact	or: g-value:	U-value:	Area:	No. of Openings
Front Door	mm	1	0	0.91	2.52	1
Win 1	16mm or more	0.8	0.4	1.4	0.91	2
Win 2	16mm or more	0.8	0.4	1.4	2.01	1
Win 3	16mm or more	0.8	0.4	1.4	5.95	1
Win 4	16mm or more	0.8	0.4	1.4	2.9	1
Win 5	16mm or more	0.8	0.4	1.4	2.01	1
Win 6	16mm or more	0.8	0.4	1.4	0.9	1
Name:	Type-Name:	Location:	Orient:		Width:	Height:
Front Door		Ext Wall	North West		1.05	2.4
Win 1		Ext Wall	North East		0.46	1.97
Win 2		Ext Wall	North East		1.02	1.97
Win 3		Ext Wall	South East		2.48	2.4
Win 4		Ext Wall	South East		1.47	1.97
Win 5		Ext Wall	South East		1.02	1.97
Win 6		Ext Wall	North West		0.46	1.95
Overshading:	A	verage or unknown				
Opaque Element	S:					
Туре:	Gross area: Openin	gs: Net area:	U-value:	Ru value:	Curtain	wall: Kappa:

SAP Input

External Elements							
Ext Wall	59.04	18.11	40.93	0.14	0	False	N/A
Concrete Column	6.55	0	6.55	0.2	0	False	N/A
Common Area	27.56	0	27.56	0.2	0.9	False	N/A
Roof Terrace	9.35	0	9.35	0.2	0		N/A
Exposed Floor	47.27			0.1			N/A
Internal Elements							
Party Elements							
Party Wall	23.27						N/A

Thermal bridges:

Thermal bridges:	User-defined	User-defined (individual PSI-values) Y-Value = 0.1068								
C C	Length	Psi-value								
[Approved]	8.42	0.3	E2	Other lintels (including other steel lintels)						
[Approved]	4.89	0.04	E3	Sill						
[Approved]	33.2	0.05	E4	Jamb						
[Approved]	19.01	0.07	E7	Party floor between dwellings (in blocks of flats)						
[Approved]	15.72	0.09	E16	Corner (normal)						
	7.14	0.08	E14	Flat roof						
[Approved]	7.86	-0.09	E17	Corner (inverted internal area greater than external area)						
	13.04	0.14	E7	Party floor between dwellings (in blocks of flats)						
	12.21	0.32	E20	Exposed floor (normal)						
	2.62	0.12	E25	Staggered party wall between dwellings						
[Approved]	0	0.16	E5	Ground floor (normal)						
[Approved]	0	0.07	E6	Intermediate floor within a dwelling						
[Approved]	0	0.06	E18	Party wall between dwellings						
	6.91	0.12	E24	Eaves (insulation at ceiling level - inverted)						
	8.88	0.24	P8	Exposed floor (inverted)						
	8.88	0	P3	Intermediate floor between dwellings (in blocks of flats)						
	0	0.24	P4	Roof (insulation at ceiling level)						

Ventilation:	
Pressure test: Ventilation:	Yes (As designed) Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, Rigid Approved Installation Scheme: True
Number of chimneys: Number of open flues: Number of fans: Number of passive stacks: Number of sides sheltered: Pressure test:	0 0 0 0 2 3
Main heating system:	
Main heating system:	Community heating schemes Heat source: Community heat pump heat from electric heat pump, heat fraction 1, efficiency 383 Piping>=1991, pre-insulated, low temp, variable flow
Main heating Control:	
Main heating Control:	Charging system linked to use of community heating, programmer and at least two room thermostats Control code: 2312
Secondary heating system:	
Secondary heating system: Water heating:	None
Water heating:	From main heating system

SAP Input

Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff: In Smoke Control Area: Conservatory: Low energy lights: Terrain type: EPC language: Wind turbine: Photovoltaics: Assess Zero Carbon Home: Standard Tariff Unknown No conservatory 100% Low rise urban / suburban English No None No

User Details:													
Assessor Name: Software Name:	Ben Talbut Stroma FS/			Stroma Softwa					036639 on: 1.0.5.17				
			Property .	Address:	D2-04								
Address :													
1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³)													
Ground floor				· ·	(1a) x		i ght(m) .62	(2a) =	Volume(m ³) 237.71	(3a)			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 90.73 (4)													
Dwelling volume					(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	237.71	(5)			
2. Ventilation rate:				- 11		4 - 4 - 1							
Number of chimneys Number of open flues	main heating	seconda heating + 0 + 0	iry + +	0 0] = [total 0 0		40 = 20 =	m ³ per hour	(6a) (6b)			
				0		-		10 =					
Number of intermittent fan	5					0			0	(7a)			
Number of passive vents						0	x ?	10 =	0	(7b)			
Number of flueless gas fire	es					0	x 4	40 =	0	(7c)			
								Air ch	anges per ho	ur			
Infiltration due to chimney. If a pressurisation test has be					continue fr	0 0 <i>m (</i> 9) to (÷ (5) =	0	(8)			
Number of storeys in the			ou to (11), t				10)		0	(9)			
Additional infiltration	U (,					[(9)-	-1]x0.1 =	0	(10)			
Structural infiltration: 0.2	25 for steel or	timber frame o	or 0.35 for	r masonr	y constr	uction			0	(11)			
if both types of wall are pre deducting areas of opening	gs); if equal user	0.35	-							_			
If suspended wooden flo			0.1 (seale	ed), else	enter 0				0	(12)			
If no draught lobby, ente									0	(13)			
Percentage of windows Window infiltration	and doors dra	aught stripped		0.25 - [0.2	$\mathbf{v}(14) \pm 1$	001 -			0	(14)			
Infiltration rate				(8) + (10)		-	⊦ (15) =		0	(15)			
Air permeability value, c	50 expresse	d in cubic metr						area	0	(16) (17)			
If based on air permeabilit			•		•		molopo	aioa	0.15	(18)			
Air permeability value applies						is being us	sed		0.10				
Number of sides sheltered	I								2	(19)			
Shelter factor				(20) = 1 - [[0.075 x (1	9)] =			0.85	(20)			
Infiltration rate incorporation	ng shelter fact	tor		(21) = (18)) x (20) =				0.13	(21)			
Infiltration rate modified fo	<u> </u>	d speed					·		1				
Jan Feb N	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Monthly average wind spe	ed from Table	e 7							1				
(22)m= 5.1 5 4	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7					
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m= 1.27 1.25 1	.23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18					

Adjuste	ed infiltra	tion rate	e (allowi	ng for sr	elter an	a wina s	peed) =	(ZTA) X	(zza)m					
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
	ate effec		-	ate for t	he appli	cable ca	se					 Г		
	echanica			maliu NL (O	0h) (00a) F ann (a	auratian (N) (00-)		Ļ	0.5	(23a)
	aust air he) = (23a)		Ļ	0.5	(23b)
	anced with		-	-	-						_	Ĺ	74.8	(23c)
							- · ·	· · · ·	ŕ · · ·	<u>, ,</u>		l – (23c)	÷ 100]	(24-)
(24a)m=	0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(24a)
	balanced								ŕ	r í	,			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
	whole ho				-	-				F (00)	`			
	if (22b)m			-				r	· · · · · · · · · · · · · · · · · · ·	<u> </u>	-			(240)
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,	natural v if (22b)m				•					0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effec	ctive air o	change	rate - en	ter (24a) or (24b	o) or (240	c) or (24	d) in box	x (25)					
(25)m=	0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(25)
2 40	at loocoo	and ha	ot loop r	oromot	or:					•				
ELEN	at losses IFNT	Gros		Openin		Net Ar	ea	U-valı	ue	AXU		k-value		AXk
		area		m		A ,r		W/m2		(W/ł	<)	kJ/m²•k		kJ/K
Doors						2.52	x	0.91	=	2.2932				(26)
Window	ws Type	1				0.91 x1/[1/(1.4)+ 0.04] =			0.04] =	1.21				(27)
Window	ws Type	2				2.01	x1/	/[1/(1.4)+	0.04] =] = 2.66				(27)
Window	ws Type	3				5.95	x1/	/[1/(1.4)+	0.04] =	7.89				(27)
Window	ws Type	4												
Window		Windows Type 4					x1/	/[1/(1.4)+	0.04] =	3.84				(27)
	Windows Type 5					2.9 2.01		/[1/(1.4)+ /[1/(1.4)+	L	3.84 2.66				(27) (27)
Window	ws Type ws Type						x1/		0.04] =					
Windov Floor						2.01	x1/	/[1/(1.4)+	0.04] =	2.66			7	(27)
	ws Type		4	18.1'	1	2.01	x1/ x1/ x1/	/[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [2.66 1.19				(27)
Floor	ws Type Type1	6		18.1	1	2.01 0.9 47.27	x1/ x1/ x1/	/[1/(1.4)+ /[1/(1.4)+ 0.1	0.04] = [0.04] = [= [2.66 1.19 4.727				(27) (27) (28)
Floor Walls T	ws Type Type1 Type2	6 59.04	5		1	2.01 0.9 47.27 40.93	x1/ x1/ x2 x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14	0.04] = [0.04] = [= [= [2.66 1.19 4.727 5.73				(27) (27) (28) (28) (29)
Floor Walls 1 Walls 1	ws Type Type1 Type2	6 59.04 6.55	6	0		2.01 0.9 47.27 40.93 6.55	x1/ x1/ x2 x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2	0.04] = [0.04] = [] = [] = [] = [2.66 1.19 4.727 5.73 1.31				(27) (27) (28) (29) (29)
Floor Walls T Walls T Walls T Roof	ws Type Type1 Type2	6 59.04 6.55 27.56 9.35	5 6 5	0		2.01 0.9 47.27 40.93 6.55 27.56	x1/ x1/ x1/ x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17	0.04] = [0.04] = [] = [] = [] = [] = [2.66 1.19 4.727 5.73 1.31 4.67				(27) (27) (28) (29) (29) (29)
Floor Walls T Walls T Walls T Roof	ws Type Type1 Type2 Type3 trea of ele	6 59.04 6.55 27.56 9.35	5 6 5	0		2.01 0.9 47.27 40.93 6.55 27.56 9.35	x1/ x1/ x x x x x x x x x x x 7	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17 0.2	0.04] = [0.04] = [] = [] = [] = [] = [2.66 1.19 4.727 5.73 1.31 4.67				(27) (27) (28) (29) (29) (29) (29) (30) (31)
Floor Walls T Walls T Walls T Roof Total a Party w	ws Type Type1 Type2 Type3 trea of el- vall dows and r	6 59.04 6.55 27.56 9.35 ements,	5 6 5 , m ² <i>ws, use e</i>	0 0 0	ndow U-ve	2.01 0.9 47.27 40.93 6.55 27.56 9.35 149.7 23.27	x1/ x1/ x1/ x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17 0.2 0	0.04] = [0.04] = [] = [] = [] = [] = [] = [2.66 1.19 4.727 5.73 1.31 4.67 1.87 0	[]]	paragraph		(27) (27) (28) (29) (29) (29) (29) (29) (30)
Floor Walls T Walls T Walls T Roof Total a Party w * for wind ** include	ws Type Type1 Type2 Type3 rrea of el vall dows and r le the areas	6 59.0 6.55 27.5 9.35 ements,	6 5 , m ² ows, use e sides of in	0 0 0 ffective wi	ndow U-ve	2.01 0.9 47.27 40.93 6.55 27.56 9.35 149.7 23.27	x1/ x1/ x x x x x x x x x x 7 x ated using	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17 0.2 0 formula 1	0.04] = [0.04] = [] = [2.66 1.19 4.727 5.73 1.31 4.67 1.87 0	[[[[[[[[[[[paragraph		(27) (27) (28) (29) (29) (29) (29) (30) (31) (32)
Floor Walls T Walls T Walls T Roof Total a Party w * for wind ** include Fabric	ws Type Type1 Type2 Type3 area of el- vall dows and r le the areas heat loss	6 59.04 6.55 27.56 9.35 ements, roof windo s on both s, W/K =	5 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 0 0 ffective wi	ndow U-ve	2.01 0.9 47.27 40.93 6.55 27.56 9.35 149.7 23.27	x1/ x1/ x x x x x x x x x x 7 x ated using	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17 0.2 0	$\begin{array}{c} 0.04] = \\ \\ 0.04] = \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	2.66 1.19 4.727 5.73 1.31 4.67 1.87 0 ue)+0.04] a	-	[41.27	(27) (27) (28) (29) (29) (29) (29) (30) (31) (31) (32)
Floor Walls T Walls T Walls T Roof Total a Party w * for wind ** includ Fabric Heat ca	ws Type Type1 Type2 Type3 rrea of el vall dows and r le the areas	59.04 59.04 6.55 27.56 9.35 ements, roof windown in the second secon	5 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 0 0 ffective wi ternal walk	ndow U-ve	2.01 0.9 47.27 40.93 6.55 27.56 9.35 149.7 23.27 alue calcula itions	x1/ x1/ x x x x x x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2 0.17 0.2 0 formula 1	$\begin{array}{c} 0.04] = \\ \\ 0.04] = \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	2.66 1.19 4.727 5.73 1.31 4.67 1.87 0	2) + (32a).	[(27) (27) (28) (29) (29) (29) (30) (31) (32)

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

can be ι	used inste	ad of a de	tailed calc	ulation.										
Therm	al bridg	es : S (L	x Y) cal	culated	using Ap	pendix l	<						16	(36)
if details	s of therma	al bridging	are not kr	10wn (36) =	= 0.05 x (3	1)								_
Total f	abric he	at loss							(33) +	(36) =			57.27	(37)
Ventila	ation hea	at loss ca	alculated	monthl	/				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	22.64	22.39	22.14	20.89	20.64	19.39	19.39	19.14	19.89	20.64	21.14	21.64		(38)
Heat ti	ransfer o	coefficier	nt, W/K				-		(39)m	= (37) + (3	38)m			
(39)m=	79.9	79.65	79.4	78.15	77.9	76.65	76.65	76.4	77.15	77.9	78.4	78.9		
				/ 21/						-	Sum(39)1.	12 /12=	78.09	(39)
	· · ·	Imeter (H	<u>,</u>	1	0.00	0.04	0.04	0.04		= (39)m ÷	· · ·	0.07	l	
(40)m=	0.88	0.88	0.88	0.86	0.86	0.84	0.84	0.84	0.85	0.86	0.86	0.87		
Numbe	er of day	/s in moi	nth (Tab	le 1a)					,	Average =	Sum(40)₁.	12 /12=	0.86	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
				•							•			
4 Wa	ater hea	tina ener	rav reau	irement:								kWh/ye	ear:	
1			igy ioqu											
		ipancy, l										64		(42)
	·A > 13. ·A £ 13.		+ 1.76 x	(1 - exp	(-0.0003	349 x (11	-A -13.9)2)] + 0.0)013 x (IFA -13.	.9)			
			ater usa	ae in litre	es per da	av Vd.av	erade =	(25 x N)	+ 36		96	5.8		(43)
Reduce	the annua	al average	hot water	usage by	5% if the c	welling is	designed t	to achieve		se target o				()
not mor	e that 125	litres per j	person pe	r day (all w	ater use, l	hot and co	ld)				-			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres per	r day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)					-	
(44)m=	106.47	102.6	98.73	94.86	90.99	87.12	87.12	90.99	94.86	98.73	102.6	106.47		
				-			-				m(44) ₁₁₂ =		1161.54	(44)
Energy	content of	hot water	used - ca	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	0Tm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	157.9	138.1	142.51	124.24	119.21	102.87	95.32	109.39	110.69	129	140.82	152.92		_
11								h		Total = Su	m(45) ₁₁₂ =		1522.96	(45)
It instan	r		- ·	· ·	not water	r storage), I	1	boxes (46)	1 to (61)				1	
(46)m=	23.68	20.71	21.38	18.64	17.88	15.43	14.3	16.41	16.6	19.35	21.12	22.94		(46)
	storage		includir	na anv si	alar or M		storada	within sa	mavas	مما		0	l	(47)
-							-			501		0		(47)
		-		ank in dw ar (this in	-			(47) mbi boile	are) ente	ər '()' in ((17)			
	storage		not wat			nstantai								
	-		eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
		actor fro				,	• /					0		(49)
-				, kWh/ye	ar			(48) x (49)	_			10		(50)
			-	cylinder l		or is not		() // ()				10		(00)
Hot wa	ater stor	age loss	factor f	rom Tabl							0.	02		(51)
		neating s		on 4.3										
		from Ta									1.	03		(52)
Tempe	erature f	actor fro	m Table	2b							0	.6		(53)

		m water (54) in (5	-	, kWh/ye	ear		(47) x (51) x (52) x (53) =					03 03		(54) (55)
	. ,	loss cal	,	for each	month			((56)m = (55) × (41)ı	m	I.	.03		(00)
		r —	-	i		20.00	i	n / .		r	20.00	22.04	I	(56)
(56)m= If cylinde	32.01	28.92 s dedicate	32.01 d solar sto	30.98	32.01 m = (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	ix H	(50)
-	r	r		- · ·	r · ·	1		· ·		r	1			(57)
(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)
	•	loss (ar	,									0		(58)
	•				```	,	(58) ÷ 36	``'						
	· · ·	i	i	i		i	ter heatii	<u> </u>	· ·	· · · · · · · · · · · · · · · · · · ·	<u> </u>	00.00	I	(59)
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(39)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m				1		
(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=	213.18	188.03	197.78	177.73	174.49	156.36	150.6	164.66	164.19	184.28	194.31	208.19		(62)
Solar DI	HW input	calculated	using App	endix G o	r Appendix	: H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter											
(64)m=	213.18	188.03	197.78	177.73	174.49	156.36	150.6	164.66	164.19	184.28	194.31	208.19		_
								Outp	out from wa	ater heate	r (annual)₁	12	2173.8	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m=	96.72	85.86	91.6	84.1	83.86	77	75.92	80.59	79.6	87.11	89.62	95.07		(65)
inclu	ide (57)	m in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Int	ternal ga	ains (see	e Table 5	5 and 5a):									
		s (Table			/									
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	158.13	158.13	158.13		<u> </u>		158.13	158.13		158.13	158.13	158.13		(66)
Liahtin	a aains			pendix	L. equat	ion L9 o	r L9a), a	lso see [:]	Table 5					
(67)m=	54.07	48.02	39.06	29.57	22.1	18.66	20.16	26.21	35.18	44.66	52.13	55.57		(67)
	nces da	ins (calc	ulated in	Append	l dixlea	L Lation I	13 or L1	i 3a) also) see Tal	l ble 5				
(68)m=	358.83	362.55	353.17	333.19	307.98	284.28	268.45	264.72	274.1	294.08	319.3	342.99		(68)
							or L15a							
(69)m=	53.45	53.45	53.45	53.45	53.45	53.45	53.45	53.45	53.45	53.45	53.45	53.45		(69)
		ns gains				00110			00110		00110	00110		(/
(70)m=				0	0	0	0	0	0	0	0	0	l	(70)
							0	0	0	0	0	0		()
		· · · · · · · · · · · · · · · · · · ·	-105.42	1	es) (Tab	, 1	405.40	405 40	405 40	405 40	405.40	405 40	I	(71)
		-105.42		-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42		(71)
		gains (T	· · · ·	449-5-5	4/2=:	400	400 5 1	400	449 ==	4	464 :=	407		(70)
(72)m=	130	127.77	123.12	116.81	112.71	106.94	102.04	108.32	110.56	117.09	124.47	127.78		(72)
	r	gains =	· · · · · · · · · · · · · · · · · · ·		-	r · ·)m + (67)m	1		· · ·	r	i	l	(===)
(73)m=	649.06	644.5	621.51	585.73	548.95	516.04	496.81	505.41	526	561.99	602.05	632.5		(73)
6. So	lar gains	S:												

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

Orientation:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	0.91	×	11.28	x	0.4	x	0.8	=	4.55	(75)
Northeast 0.9x	0.77	x	2.01	x	11.28	x	0.4	x	0.8	=	5.03	(75)
Northeast 0.9x	0.77	x	0.91	x	22.97	x	0.4	x	0.8	=	9.27	(75)
Northeast 0.9x	0.77	x	2.01	x	22.97	x	0.4	x	0.8	=	10.24	(75)
Northeast 0.9x	0.77	x	0.91	x	41.38	x	0.4	x	0.8	=	16.7	(75)
Northeast 0.9x	0.77	x	2.01	x	41.38	x	0.4	x	0.8	=	18.44	(75)
Northeast 0.9x	0.77	x	0.91	x	67.96	x	0.4	x	0.8	=	27.43	(75)
Northeast 0.9x	0.77	x	2.01	×	67.96	x	0.4	x	0.8	=	30.29	(75)
Northeast 0.9x	0.77	x	0.91	x	91.35	x	0.4	x	0.8	=	36.87	(75)
Northeast 0.9x	0.77	x	2.01	×	91.35	x	0.4	x	0.8	=	40.72	(75)
Northeast 0.9x	0.77	x	0.91	×	97.38	x	0.4	x	0.8	=	39.3	(75)
Northeast 0.9x	0.77	x	2.01	x	97.38	x	0.4	x	0.8	=	43.41	(75)
Northeast 0.9x	0.77	x	0.91	×	91.1	x	0.4	x	0.8	=	36.77	(75)
Northeast 0.9x	0.77	x	2.01	×	91.1	x	0.4	x	0.8	=	40.61	(75)
Northeast 0.9x	0.77	x	0.91	x	72.63	x	0.4	x	0.8	=	29.31	(75)
Northeast 0.9x	0.77	x	2.01	x	72.63	x	0.4	x	0.8	=	32.37	(75)
Northeast 0.9x	0.77	x	0.91	x	50.42	x	0.4	x	0.8	=	20.35	(75)
Northeast 0.9x	0.77	x	2.01	×	50.42	x	0.4	x	0.8	=	22.47	(75)
Northeast 0.9x	0.77	x	0.91	×	28.07	x	0.4	x	0.8	=	11.33	(75)
Northeast 0.9x	0.77	x	2.01	×	28.07	x	0.4	x	0.8	=	12.51	(75)
Northeast 0.9x	0.77	x	0.91	×	14.2	x	0.4	x	0.8	=	5.73	(75)
Northeast 0.9x	0.77	x	2.01	×	14.2	x	0.4	x	0.8	=	6.33	(75)
Northeast 0.9x	0.77	x	0.91	×	9.21	x	0.4	x	0.8	=	3.72	(75)
Northeast 0.9x	0.77	x	2.01	x	9.21	x	0.4	x	0.8	=	4.11	(75)
Southeast 0.9x	0.77	x	5.95	x	36.79	x	0.4	x	0.8	=	48.55	(77)
Southeast 0.9x	0.77	x	2.9	x	36.79	x	0.4	x	0.8	=	23.66	(77)
Southeast 0.9x	0.77	x	2.01	×	36.79	x	0.4	x	0.8	=	16.4	(77)
Southeast 0.9x	0.77	x	5.95	x	62.67	x	0.4	x	0.8	=	82.7	(77)
Southeast 0.9x	0.1.1	x	2.9	×	62.67	x	0.4	x	0.8	=	40.31	(77)
Southeast 0.9x	0.77	x	2.01	x	62.67	x	0.4	x	0.8	=	27.94	(77)
Southeast 0.9x	0.77	x	5.95	×	85.75	x	0.4	x	0.8	=	113.15	(77)
Southeast 0.9x	0.77	x	2.9	×	85.75	x	0.4	x	0.8	=	55.15	(77)
Southeast 0.9x	0.77	x	2.01	x	85.75	x	0.4	x	0.8	=	38.22	(77)
Southeast 0.9x	0.77	x	5.95	x	106.25	x	0.4	x	0.8	=	140.2	(77)
Southeast 0.9x		x	2.9	×	106.25	x	0.4	x	0.8	=	68.33	(77)
Southeast 0.9x		x	2.01	x	106.25	x	0.4	x	0.8	=	47.36	(77)
Southeast 0.9x		x	5.95	x	119.01	x	0.4	x	0.8	=	157.03	(77)
Southeast 0.9x	-	x	2.9	×	119.01	x	0.4	x	0.8	=	76.54	(77)
Southeast 0.9x	0.77	x	2.01	x	119.01	x	0.4	x	0.8	=	53.05	(77)

		-		,		•		_				_
Southeast 0.9x	0.77	x	5.95	x	118.15	×	0.4	×	0.8	=	155.9	(77)
Southeast 0.9x	0.77	x	2.9	x	118.15	x	0.4	x	0.8	=	75.98	(77)
Southeast 0.9x	0.77	x	2.01	x	118.15	x	0.4	x	0.8	=	52.66	(77)
Southeast 0.9x	0.77	x	5.95	x	113.91	x	0.4	x	0.8	=	150.3	(77)
Southeast 0.9x	0.77	x	2.9	x	113.91	x	0.4	x	0.8	=	73.26	(77)
Southeast 0.9x	0.77	x	2.01	x	113.91	x	0.4	x	0.8	=	50.77	(77)
Southeast 0.9x	0.77	x	5.95	x	104.39	x	0.4	x	0.8	=	137.74	(77)
Southeast 0.9x	0.77	x	2.9	x	104.39	x	0.4	x	0.8	=	67.13	(77)
Southeast 0.9x	0.77	x	2.01	x	104.39	x	0.4	x	0.8	=	46.53	(77)
Southeast 0.9x	0.77	x	5.95	×	92.85	x	0.4	x	0.8	=	122.52	(77)
Southeast 0.9x	0.77	x	2.9	x	92.85	x	0.4	x	0.8	=	59.71	(77)
Southeast 0.9x	0.77	x	2.01	x	92.85	x	0.4	x	0.8	=	41.39	(77)
Southeast 0.9x	0.77	x	5.95	x	69.27	x	0.4	x	0.8	=	91.4	(77)
Southeast 0.9x	0.77	x	2.9	x	69.27	x	0.4	×	0.8	=	44.55	(77)
Southeast 0.9x	0.77	x	2.01	x	69.27	x	0.4	×	0.8	=	30.88	(77)
Southeast 0.9x	0.77	x	5.95	x	44.07	x	0.4	x	0.8	=	58.15	(77)
Southeast 0.9x	0.77	x	2.9	x	44.07	x	0.4	x	0.8	=	28.34	(77)
Southeast 0.9x	0.77	x	2.01	x	44.07	x	0.4	x	0.8	=	19.64	(77)
Southeast 0.9x	0.77	x	5.95	x	31.49	x	0.4	x	0.8	=	41.55	(77)
Southeast 0.9x	0.77	x	2.9	x	31.49	x	0.4	x	0.8	=	20.25	(77)
Southeast 0.9x	0.77	x	2.01	x	31.49	x	0.4	x	0.8	=	14.04	(77)
Northwest 0.9x	0.77	x	0.9	x	11.28	x	0.4	x	0.8	=	2.25	(81)
Northwest 0.9x	0.77	x	0.9	x	22.97	x	0.4	x	0.8	=	4.58	(81)
Northwest 0.9x	0.77	x	0.9	x	41.38	x	0.4	×	0.8	=	8.26	(81)
Northwest 0.9x	0.77	x	0.9	x	67.96	x	0.4	x	0.8	=	13.56	(81)
Northwest 0.9x	0.77	x	0.9	x	91.35	x	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	x	0.9	x	97.38	x	0.4	×	0.8	=	19.44	(81)
Northwest 0.9x	0.77	x	0.9	x	91.1	x	0.4	x	0.8	=	18.18	(81)
Northwest 0.9x	0.77	x	0.9	x	72.63	x	0.4	x	0.8	=	14.5	(81)
Northwest 0.9x	0.77	x	0.9	x	50.42	x	0.4	×	0.8	=	10.06	(81)
Northwest 0.9x	0.77	x	0.9	x	28.07	x	0.4	×	0.8	=	5.6	(81)
Northwest 0.9x	0.77	x	0.9	x	14.2	x	0.4	x	0.8	=	2.83	(81)
Northwest 0.9x	0.77	x	0.9	x	9.21	x	0.4	×	0.8	=	1.84	(81)
Solar <u>g</u> ains in	watts, calcul	ated	for each mon	th		(83)m	n = Sum(74)m	.(82)m				
(83)m= 100.45		9.92	327.17 382.43		86.69 369.89	327	.59 276.5	196.20	6 121.03	85.5	l	(83)
Total gains – i				`							1	
(84)m= 749.51	819.53 87	1.43	912.9 931.3	8 9	02.73 866.69	83	3 802.5	758.2	5 723.08	718	l	(84)

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

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

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

21

(85)

(86)m=	0.99	0.98	0.95	0.88	0.74	0.54	0.39	0.42	0.65	0.89	0.97	0.99		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	20.35	20.48	20.65	20.84	20.96	21	21	21	20.99	20.85	20.58	20.33		(87)
Temp	erature	during h	eating p	periods ir	n rest of	dwelling	from Ta	able 9, Tl	h2 (°C)					
(88)m=	20.18	20.19	20.19	20.2	20.2	20.21	20.21	20.22	20.21	20.2	20.2	20.19		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.98	0.97	0.94	0.85	0.69	0.47	0.32	0.35	0.58	0.86	0.97	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ing T2 (f	ollow ste	eps 3 to 7	7 in Tabl	le 9c)				
(90)m=	19.34	19.51	19.76	20.03	20.17	20.21	20.21	20.22	20.2	20.05	19.67	19.31		(90)
									1	fLA = Livin	g area ÷ (4	4) =	0.31	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	19.66	19.82	20.04	20.28	20.41	20.46	20.46	20.46	20.45	20.3	19.96	19.63		(92)
Apply	adjustr			n interna	temper	r	m Table	4e, whe	ere appro	opriate				
(93)m=	19.66	19.82	20.04	20.28	20.41	20.46	20.46	20.46	20.45	20.3	19.96	19.63		(93)
		ting requ						-						
				mperatui using Ta		ied at ste	ep 11 of	l able 9	o, so tha	it II,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa		tor for g		<u> </u>										
(94)m=	0.98	0.97	0.94	0.85	0.7	0.49	0.34	0.37	0.6	0.86	0.96	0.99		(94)
Usefu	l gains,	hmGm	W = (94	4)m x (84	4)m									
(95)m=	735.77	793.01	815.2	778.74	651.88	446.56	295.77	310.06	481.53	654.57	696	707.33		(95)
	-	-		perature		1	i	i		i	·			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
				al tempe		r	r			Ē.	4000.05	4047.50		(97)
(97)m=	1227.03		1075.01	889.74	678.87	449.02	295.96	310.38	489.65	755.73	1008.05	1217.52		(97)
(98)m=	365.49	265.5	193.3	or each n 79.92	20.08		11 = 0.02	24 X [(97])m – (95 0	75.26	224.67	379.58		
(00)		20010			20100	Ů	Ů			(kWh/year			1603.8	(98)
Snace	hoatin	a require	amont in	kWh/m²	woor				1 - 7		, (-		17.68	 (99)
					•							l	17.00	
				mmunity				ting prov	ided by	0.00mm	unity on	omo		
				ating, spa condary/							unity scr	ieme.	0	(301)
				mmunity		-	-	,	,				1](302)
				-				allows for	CHP and i	up to four a	other heat	l sources; th		
	-	-		mal and wa							suloi nout			_
Fractio	n of hea	at from C	Commun	ity heat	pump								1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity he	eat pump	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	12c) for c	commun	ity heatii	ng syste	m				[1.05	(306)
Space	heating	a										L	kWh/year	-1
-		heating	requiren	nent								[1603.8	٦
		2										L		_

Space heat from Community heat pum	_				
	ip	(98) x (304a) x	(305) x (306) =	1683.99	(307a)
Efficiency of secondary/supplementary	v heating system in % (from Ta	able 4a or Apper	ndix E)	0	(308
Space heating requirement from secor	ndary/supplementary system	(98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2173.8	1
If DHW from community scheme: Water heat from Community heat pum	p	(64) x (303a) x	(305) x (306) =	2282.49	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	'e) + (310a)(310e)] =	39.66	(313)
Cooling System Energy Efficiency Rati	io			0	(314)
Space cooling (if there is a fixed coolin	g system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dumechanical ventilation - balanced, extr	•	ide		221.13	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	ar	=(330a) + (330	b) + (330g) =	221.13	(331)
Energy for lighting (calculated in Appen	ndix L)			381.95	(332)
Total delivered energy for all uses (307	7) + (309) + (310) + (312) + (3	15) + (331) + (33	32)(237b) =	4569.57	(338)
10b. Fuel costs – Community heating	scheme				-
	Fuel kWh/year		I Price ble 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x		4.24 × 0.01 =	71.4	(340a)
Water heating from CHP	(310a) x		4.24 x 0.01 =	96.78	
			4.24	50:10	(342a)
		Fue	el Price	00.10	_(342a)
Pumps and fans	(331)	Fue	el Price 13.19 × 0.01 =	29.17	(342a)
Pumps and fans Energy for lighting	(331) (332)	Fue	el Price		-
•	(332)	Fue	SI Price 13.19 × 0.01 =	29.17](349)
Energy for lighting	(332)		SI Price 13.19 × 0.01 =	29.17](349)](350)
Energy for lighting Additional standing charges (Table 12)	(332) = (340a)(342e) + (345)(354) =		SI Price 13.19 × 0.01 =	29.17 50.38 120](349)](350)](351)
Energy for lighting Additional standing charges (Table 12) Total energy cost	(332) = (340a)(342e) + (345)(354) =		SI Price 13.19 × 0.01 =	29.17 50.38 120](349)](350)](351)
Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating	(332) = (340a)(342e) + (345)(354) =		SI Price 13.19 × 0.01 =	29.17 50.38 120 367.73](349)](350)](351)](355)
Energy for lighting Additional standing charges (Table 12) Total energy cost <u>11b. SAP rating - Community heating</u> Energy cost deflator (Table 12)	(332) = (340a)(342e) + (345)(354) = scheme		SI Price 13.19 × 0.01 =	29.17 50.38 120 367.73 0.42	(349) (350) (351) (355) (355)
Energy for lighting Additional standing charges (Table 12) Total energy cost <u>11b. SAP rating - Community heating</u> Energy cost deflator (Table 12) Energy cost factor (ECF)	(332) = (340a)(342e) + (345)(354) = scheme [(355) x (356)] ÷ [(4) + 45.0] = ating scheme		13.19 x 0.01 = 13.19 x 0.01 = 13.19 x 0.01 =	29.17 50.38 120 367.73 0.42 1.14 84.13	(349) (350) (351) (355) (355) (356) (357)
Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12)	(332) = (340a)(342e) + (345)(354) = scheme [(355) x (356)] ÷ [(4) + 45.0] = ating scheme		SI Price 13.19 × 0.01 =	29.17 50.38 120 367.73 0.42 1.14 84.13	(349) (350) (351) (355) (355) (356) (357)
Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12)	(332) = (340a)(342e) + (345)(354) = scheme [(355) × (356)] ÷ [(4) + 45.0] = ating scheme	Energy kWh/year	Emission factor kg CO2/kWh	29.17 50.38 120 367.73 0.42 1.14 84.13 Emissions kg CO2/year	(349) (350) (351) (355) (355) (356) (357)
Energy for lighting Additional standing charges (Table 12) Total energy cost 11b. SAP rating - Community heating Energy cost deflator (Table 12) Energy cost factor (ECF) SAP rating (section12) 12b. CO2 Emissions – Community heat CO2 from other sources of space and	(332) = (340a)(342e) + (345)(354) = scheme [(355) x (356)] ÷ [(4) + 45.0] = ating scheme water heating (not CHP) If there is CHP using two	Energy kWh/year	Emission factor kg CO2/kWh	29.17 50.38 120 367.73 0.42 1.14 84.13 Emissions kg CO2/year	(349) (350) (351) (355) (355) (356) (357) (358)

Total CO2 associated with community	systems	(363)(366) + (368)(37)	2)	= [558.08	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =		[558.08	(376)
CO2 associated with electricity for pur	ips and fans within dwo	elling (331)) x	0.52	=	114.77	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	198.23	(379)
Total CO2, kg/year	sum of (376)(382) =				871.08	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				9.6	(384)
El rating (section 14)					91.4	(385)
13b. Primary Energy – Community hea	ting scheme					
		Energy kWh/year	Primary factor		Energy Vh/year	
Energy from other sources of space an Efficiency of heat source 1 (%)		H P) sing two fuels repeat (363) to	(366) for the secon	d fuel	383	(367a)
Energy associated with heat source 1	[(307]	o)+(310b)] x 100 ÷ (367b) x	3.07	=	3179.4	(367)
Electrical energy for heat distribution		[(313) x		=	121.77	(372)
Total Energy associated with communi	ty systems	(363)(366) + (368)(37)	2)	=	3301.17	(373)
if it is negative set (373) to zero (unle	ess specified otherwise	e, see C7 in Appendix C)	[3301.17	(373)
Energy associated with space heating	(secondary)	(309) x	0	=	0	(374)
Energy associated with water from imn	nersion heater or insta	ntaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space an	d water heating	(373) + (374) + (375) =		[3301.17	(376)
Energy associated with space cooling		(315) x	3.07	=	0	(377)
Energy associated with electricity for p	umps and fans within o	dwelling (331)) x	3.07	=	678.88	(378)
Energy associated with electricity for lig	ghting	(332))) x	3.07	=	1172.59	(379)
Total Primary Energy, kWh/yea	ar sum of (376	6)(382) =			5152.64	(383)

Assessor Name: Ben Taibut: Stroma Number: STR0036639 Software Name: Stroma FSAP 2012 Content Variance Version: 1.0.5.17 Address: Image: Content Variance Content Variance Version: 1.0.5.17 Ground floor Image: Content Variance Image: Content Variance Vorume(m) Vorume(m) Ground floor Image: Content Variance Image: Content Variance Vorume(m) Vorume(m) Content floor Image: Content Variance Image: Content Variance Image: Content Variance Vorume(m) Outling volume Image: Content Variance Image: Content				User De	etails:						
Software Name: Stroma FSAP 2012 Software Version: Version:: 1.0.5.17 Property Address: Development Address: <	Assessor Name:	Ben Talbutt		;	Stroma	a Num	ber:		STRO	036639	
Adverse : I. Overall divelling dimensions: Area(m ³) Av. Height(m) Volume(m ³) Ground floor 90.73 (a) Volume(m ³) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 90.73 (a) Volume(m ³) Output total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 90.73 (a) Volume(m ³) Output total output total main many meansion of the colspan="2">Secondary other total many many other Number of colspan="2">total o x40 = o x40 = o Secondary many fised (1e) Many meansion Secondary other Total o x40 = o Secondary other Secondary fised (1e) <th< td=""><td>Software Name:</td><td>Stroma FSAP 20</td><td>12</td><td></td><td>Softwa</td><td>are Ver</td><td>sion:</td><td></td><td>Versio</td><td>n: 1.0.5.17</td><td></td></th<>	Software Name:	Stroma FSAP 20	12		Softwa	are Ver	sion:		Versio	n: 1.0.5.17	
I. Overall dwelling dimensions: Area(m ²) Av. Height(m) Volume(m ³) Ground floor 90.73 (a) 2.82 (2a) 237.71 (3) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 90.73 (a) 2.82 (2a) 237.71 (5) Dwelling volume (a)+(3b)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c			Pro	operty A	ddress:	D2-04					
Area(m ²)Av. Height(m)Volume(m ²)Ground floor 90.73 (i) 2.62 (2a) 237.71 (a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 90.73 (a) 90.73 (b) 2.62 (2a) 237.71 (c)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c											
Ground floor90.73(1a) \times 2.42(2a) =237.71(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)90.73(4)Output of the secondary of the secondar	1. Overall dwelling dime	nsions:									
Develoing volume(3a)+(3b)+(3c)+(3d)+(3a)+(3d)+(3a)+(3d)+(3d)+(3d)+(3d)+(3d)+(3d)+(3d)+(3d	Ground floor				. ,	(1a) x	-		(2a) =	. ,	-
2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hourNumber of chimneys 0 0 0 0 0 0 0 0 0 Number of open flues 0 0 0 10 <t< td=""><td>Total floor area TFA = (1a</td><td>a)+(1b)+(1c)+(1d)+(1</td><td>e)+(1n)</td><td>90</td><td>).73</td><td>(4)</td><td></td><td></td><td>-</td><td></td><td>_</td></t<>	Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	e)+(1n)	90).73	(4)			-		_
main heating heatingscondary heating heatingothertotalm³ per hourNumber of chimneys0+0=0<40 =	Dwelling volume			L		(3a)+(3b)	+(3c)+(3d)+(3e)+	.(3n) =	237.71	(5)
Number of chimneysheating 0+0=0×400(6a)Number of open flues0+0=0×200(6b)Number of intermittent fans0×10=0(7a)Number of passive vents0×10=0(7b)Number of flueless gas fires0×40=0(7c)Air changes per hourInfiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =0++0(6b)Number of storeys in the dwelling (ns)-0+0(10)(10)Additional infiltration((a)-1)=0.1 =0(11)0(11)If both present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(12)(12)(12)If no draught lobby, enter 0.05, else enter 00(12)0(13)Percentage of windows and doors draught stripped0(13)0(14)Window infiltration rate(2) + (10) + (1) + (1) + (13) + (16) =0(15)Air permeability value, q50, expressed in cubic metres per hour per of envelope area 3(17)0(19)Air permeability value, q50, expressed in cubic metres per hour per of envelope area 3(17)0(14)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used(19)0(15)Air permeability value applies if a pressurisation test	2. Ventilation rate:										
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 chinneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0 $+(6) =$ 0 (9) Air changes per hourInfiltration due to chinneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0 $+(6) =$ 0 (9) Number of storeys in the dwelling (ns)Additional infiltration (9) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry constructionif both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35If suspended wooden floor, enter 0.2 (unsealed), ol 1. (sealed), else enter 0 0 O (12) If no draught lobby, enter 0.05, else enter 0Percentage of windows and doors draught strippedWindow infiltration0.25 - $[0.2 \times (14) + 100] =$ OOAir permeability value, q50, expressed in cubic metres per hour per square metre of envelope areaAir permeability value, q50, expressed in cubic metres per hour per square metre of envelope areaAir permeability value, q50, expressed in cubic metres per hour per square metre of envelope areaAir permeabilit	-	heating 0 +	heating	. —		i L				-	(6a)
Number of passive vents Number of gassive vents Number of flueless gas fires 0 $\times 10 =$ 0 (7b) 0 $\times 40 =$ 0 (7c) Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0 +(6) = 0 (6) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration Structural infiltration (19)-1)x0.1 = 0 (10) Structural infiltration (25 for steel or timber frame or 0.35 for masonry construction if both yees of well are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 If no draught lobby, enter 0.05, else enter 0 If no draught lobby, enter 0.05, else enter 0 If particular infiltration 0 (12) If no draught lobby, enter 0.05, else enter 0 If based on air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17) M permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17) If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) $A_ir permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17)Infiltration rate incorporating shelter factor(20) = 1 - [0.075 \times (19]] = 0.13 (21)Infiltration rate incorporating shelter factor(21) = (18) \times (20) = 0.13 (21)Infiltration rate modified for monthly wind speedMonthly average wind speed from Table 7(22)m_{2} 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7Wind Factor (22a)m = (22)m + 4Wind Factor (22a)m = (22)m + 4$		0	0	+	0		0			0	(6b)
Number of flueless gas fires 0 $\times 40 = 0$ (7c) Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0 + (5) = 0 (6) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration (9) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of opening); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped Window infiltration at (8) + (10) + (11) + (12) + (13) + (15) = (16) Air premeability value, q50, expressed in cubic metres per hour per square metre of envelope area 1f based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19]] = (2) [19] Infiltration rate modified for monthily wind speed infiltration rate modified for monthily wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m <u>5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7</u> Wind Factor (22a)m = (22)m ÷ 4	Number of intermittent far	าร					0	x 1	10 =	0	(7a)
Air changes per hourInfiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =0+ (6) =0(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)(9)(10)Number of storeys in the dwelling (ns)0(9)(10)Additional infiltration(9)-1)x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0(11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(12)If no draught lobby, enter 0.05, else enter 00(12)(13)Percentage of windows and doors draught stripped0(14)Window infiltration0.25 - [0.2 x (14) + 100] =0(15)Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =0(16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3(17)If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)0.15(18)Air permeability value, applies if a pressurisation test has been done or a degree air permeability is being used0(13)Shelter factor(20) = 1 - [0.075 x (19)] =0.13(21)Infiltration rate modified for monthly wind speed(21) = (18) x (20) =0.13(21)Infiltration rate modified for monthly wind speed(22) = 1 - [0.075 x (19)] =0.13(21)Infiltration rate modified for month	Number of passive vents						0	x 1	10 =	0	(7b)
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) = 0 + (5) = 0$ (6) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration (9)-1/x0.1 = 0 (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (14) Window infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area Air permeability value, ap50, expressed in cubic metres per hour per square metre of envelope area Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Number of sides sheltered Mumber of sides sheltered Mumber of sides sheltered Mumber of sides sheltered Monthly average wind speed from Table 7 (22)m 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4 Wind Factor (22a)m = (22)m ÷ 4	Number of flueless gas fir	es					0	x 4	40 =	0	(7c)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration $[(9)-1]x0.1 = 0$ (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings): if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) + 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area <i>Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used</i> Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.13$ (21) Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7 (22)me <u>5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7</u> Wind Factor (22a)m = (22)m + 4 Wind Factor (22a)m = (22)m + 4									Air ch	anges per ho	ur
Number of storeys in the dwelling (ns)0Additional infiltration0Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00If no draught lobby, enter 0.05, else enter 00Percentage of windows and doors draught stripped0Window infiltration0.25 - [0.2 x (14) + 100] =Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)0.15Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used2Number of sides sheltered2(19)Shelter factor(20) = 1 - [0.075 x (19)] =0.13Infiltration rate modified for monthly wind speed2(19)JanFebMarAprMayJanFebMarAprMayJanFebMarAprMayJunJulAugSepOctVonthly average wind speed from Table 72(22) m =(22)me5.154.94.4Vind Factor (22a)m = (22)m ÷ 444.33.8Wind Factor (22a)m = (22)m ÷ 444.33.8<	Infiltration due to chimney	vs, flues and fans = (6a)+(6b)+(7a)+(7b)+(7	′c) =	Γ	0	-	÷ (5) =	0	(8)
Additional infiltration((9)-1)x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(11)If no draught lobby, enter 0.05, else enter 00(12)Percentage of windows and doors draught stripped0(13)Window infiltration0.25 - [0.2 x (14) + 100] =(16)Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =(16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3(17)If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)0.15(18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used(19)0.15Number of sides sheltered2(19)0.85(20)Infiltration rate incorporating shelter factor(21) = (18) × (20) =0.13(21)Infiltration rate modified for monthly wind speed2(19)0.85(20)Monthly average wind speed from Table 720.13(21)(22)me5.154.94.44.33.83.744.34.54.7Wind Factor (22a)m = (22)m ÷ 40000000			led, proceed	to (17), o	therwise c	ontinue fro	om (9) to (16)			-
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry constructionif both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0If no draught lobby, enter 0.05, else enter 0Percentage of windows and doors draught strippedWindow infiltration0.25 - [0.2 x (14) + 100] =01filtration rate(b) + (10) + (11) + (12) + (13) + (15) =0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area1f based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being usedNumber of sides shelteredNumber of sides sheltered1nfiltration rate incorporating shelter factor(20) = 1 - [0.075 x (19)] =1nfiltration rate modified for monthly wind speed1nfiltration rate modified for monthly wind speed1nfiltration rate modified for monthly wind speed1nfiltration rate (22) m = (5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7Wind Factor (22a) m = (22) m ÷ 4	•	e dwelling (ns)						1 (0)	11 0 1		
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 1 full ration rate Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 1 f based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor 1 f based for monthly wind speed 1 folltration rate modified for monthly wind speed 1 folltration rate modified for monthly wind speed 2 (19) 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 1 folltration rate modified for monthly wind speed 2 (20) = 1 - [0.075 x (19)] = 2 (19) 3 (21) 2 (21) 2 (21) 2 (22) m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 2 Wind Factor (22a)m = (22)m ÷ 4 2 (20)m ÷		25 for staal or timbor	fromo or () 25 for	maaaaa	voonatri	uction	[(9)-	1]x0.1 =		4
If no draught lobby, enter 0.05, else enter 00Percentage of windows and doors draught stripped0Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then (18) = [(17) $\div 20]$ +(8), otherwise (18) = (16)0.15Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor(20) = 1 - [0.075 \times (19)] =Infiltration rate modified for monthly wind speed0JanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7(22)m=5.154.94.44.33.83.744.34.34.54.7	if both types of wall are pr	esent, use the value corre					uction			0](11)
Percentage of windows and doors draught stripped0Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ 0Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speedMonthly average wind speed from Table 7 $(22)m =$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.3 4.5 4.7	If suspended wooden fl	oor, enter 0.2 (unsea	led) or 0.1	(sealed	d), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speedMonthly average wind speed from Table 7(22)me 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.3 4.4 4.3 3.8 3.7 4 4.3 4.4 4.3 3.8 3.7 4 4.3 4.4 4.3 3.8 3.7 4 4.3 4.4 4.3 3.8 3.7 4 4.3 4.4 4.3 4.4 4.3 4.4 4.3 4.4 4.3 4.4 4.3 4.4 4.3 4.4 4.3 4.4 4.5	If no draught lobby, ent	er 0.05, else enter 0								0	(13)
Influction 0 10	0	and doors draught s	tripped							0	(14)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed0.13Monthly average wind speed from Table 7(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.3 4.5 4.7					•		- C	(0	(15)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$ 0.15 (18) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used 2 (19) Number of sides sheltered 2 (19) Shelter factor (20) = 1 - [0.075 x (19)] = 0.85 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.13 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4							<i>·</i> · · <i>·</i>			0	4
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being usedNumber of sides sheltered 2 (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed 0.13 (21)Infiltration rate modified for monthly wind speed 0.13 (21)Monthly average wind speed from Table 7 $(22)m = 5.1 + 5 + 4.9 + 4.4 + 4.3 + 3.8 + 3.8 + 3.8 + 3.7 + 4.3 + 4.5 + 4.7 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 + 4.5 +$				•	•	•	etre of e	nvelope	area		=
Number of sides sheltered 2 (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 0.85 (20)Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.13 (21)Infiltration rate modified for monthly wind speed 0.13 (21)Infiltration rate modified for monthly wind speed 0.13 (21)Monthly average wind speed from Table 7 0.13 (22)m= $(22)m=$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	•	•					is heina us	ed		0.15	(18)
Shelter factor $(20) = 1 - [0.075 \times (19)] =$ (20) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ (21) Infiltration rate modified for monthly wind speedMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7(22)m=5.154.44.33.83.74Wind Factor (22a)m = (22)m ÷ 4				or a dogi		mousinty	o boing ac			2	(19)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m $\div 4$ 4.4 4.3 4.5 4.7				((20) = 1 - [0.075 x (1	9)] =				
JanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7 $(22)m=$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m $\div 4$	Infiltration rate incorporati	ng shelter factor		((21) = (18)	x (20) =				0.13	(21)
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Infiltration rate modified for	or monthly wind spee	d								
$(22)m = \begin{bmatrix} 5.1 & 5 & 4.9 & 4.4 & 4.3 & 3.8 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$ Wind Factor (22a)m = (22)m ÷ 4	Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m \div 4	Monthly average wind spe	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		
(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	Wind Factor (22a)m = (22	2)m ÷ 4									
	(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltra	ation rat	e (allowi	ng for sl	nelter ar	nd wind s	speed) =	= (21a) x	(22a)m					
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
	ate effec echanica		-	rate for t	he appli	cable ca	se		-	-	-			(00-)
				andix N (2	(25) = (23)		auation (N5)) , othe	nvise (23h	(232)			0.5	(23a)
								n Table 4h) – (23a)			0.5	(23b)
			-	-	-					0h)m. (226) [·	1 (00-0)	74.8	(23c)
(24a)m=		0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	230) × [0.27	1 – (23c) 0.28	- 100j	(24a)
												0.20		(244)
(24b)m=								MV) (24t	$\frac{1}{0}$		230)	0		(24b)
					_		_	on from (_		0	0		()
,					•	•		lc) = (22		.5 x (23b	o)			
(24c)m=	<u> </u>	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	n or wh	l ole hous	e positi	ve input	ı ventilati	on from	loft		<u> </u>			
,					•			0.5 + [(2		0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m=	0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(25)
3. He	at losse	s and he	eat loss i	paramet	er:									
ELEN		Gros		Openin		Net Ar	ea	U-val	ue	ΑXU		k-value	9	A X k
		area	(m²)	rr	2 ²	A ,r	n²	W/m2	2K .	(W/	K)	kJ/m²∙ł	<	kJ/K
Doors						2.52			=	2.2932	2			(26)
Windo	ws Type	e 1				0.91	x 1	/[1/(1.4)+	0.04] =	1.21				(27)
Windo	ws Type	2				2.01	x1	/[1/(1.4)+	0.04] =	2.66				(27)
Windo	ws Type	93				5.95	x 1	/[1/(1.4)+	0.04] =	7.89				(27)
Windo	ws Type	e 4				2.9	x 1	/[1/(1.4)+	0.04] =	3.84				(27)
Windo	ws Type	5				2.01	x1	/[1/(1.4)+	0.04] =	2.66				(27)
Windo	ws Type	6				0.9	x 1	/[1/(1.4)+	0.04] =	1.19				(27)
Floor						47.27	7 X	0.1	=	4.727				(28)
Walls ⁻	Type1	59.0)4	18.1	1	40.93	3 X	0.14	=	5.73	ו ר		$\neg \square$	(29)
Walls ⁻	Type2	6.5	5	0		6.55	x	0.2	= =	1.31	ז ר		$\neg \square$	(29)
Walls ⁻	ТуреЗ	27.5	56	0		27.56	3 X	0.17		4.67	ו ד		$\exists \Box$	(29)
Roof		9.3	5	0		9.35	x	0.2		1.87	i F		i F	(30)
Total a	Fotal area of elements, m ²						7							(31)
Party v	arty wall						7 X	0	= [0	r			(32)
•		roof wind	ows, use e	effective wi	ndow U-v	23.27 alue calcul			I		as given in	paragraph	 3.2	` ` '
			sides of ir		ls and par	titions								
			= S (A x	U)				(26)(30) + (32) =				41.27	(33)
	apacity		. ,	_							2) + (32a).	(32e) =	0	(34)
Therm	al mass	parame	ter (TMF	⁻ = Cm -	- TFA) ii	h kJ/m²K	•		Indica	tive Value	: Medium		250	(35)

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

can be ι	ised inste	ad of a de	tailed calc	ulation.										
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						16	(36)
			are not kn	own (36) =	= 0.05 x (3	1)								
	abric he								(33) +	(36) =			57.27	(37)
Ventila	tion hea	at loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)		L	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	22.64	22.39	22.14	20.89	20.64	19.39	19.39	19.14	19.89	20.64	21.14	21.64		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	79.9	79.65	79.4	78.15	77.9	76.65	76.65	76.4	77.15	77.9	78.4	78.9		
Heat lo	oss para	ameter (H	HLP), W/	/m²K				•		Average = = (39)m ÷	Sum(39)1. · (4)	12 /12=	78.09	(39)
(40)m=	0.88	0.88	0.88	0.86	0.86	0.84	0.84	0.84	0.85	0.86	0.86	0.87		
		I	1		I		I		/	Average =	Sum(40)1.	₁₂ /12=	0.86	(40)
Numbe	er of day	/s 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)
4. Wa	ater hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
_		Ŭ												
		upancy,			(0 0003		- 120)2)] + 0.0	012 v /-	TEA 12		64		(42)
	A £ 13.		+ 1.70 X	[i - exp	(-0.0003	949 X (11	A - 13.9)2)] + 0.0	013 X (IFA - 13.	.9)			
Annua	l averag	e hot wa						(25 x N)				6.8		(43)
		-				-	-	to achieve	a water us	se target o	f			
not more	e that 125	litres per	person per	aay (all w	ater use, i	not and col	ia) I						I	
	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=	106.47	102.6	98.73	94.86	90.99	87.12	87.12	90.99	94.86	98.73	102.6	106.47		
_							-	T (0000			m(44) ₁₁₂ =		1161.54	(44)
Energy	content of	hot water	used - cal	culated mo	Sonthly $= 4$.	190 x Vd,n	n x nm x L	0Tm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	157.9	138.1	142.51	124.24	119.21	102.87	95.32	109.39	110.69	129	140.82	152.92		
If instan	1000000	unter heat	na ot point	of upp (pr	botwata		ontor 0 in	havea (16		Total = Su	m(45) ₁₁₂ =	=	1522.96	(45)
			- ·				1	boxes (46,					I	
(46)m= Water	23.68 storage	20.71	21.38	18.64	17.88	15.43	14.3	16.41	16.6	19.35	21.12	22.94		(46)
	-) includir	na anv so	alar or M		storade	within sa	me ves	مما		0		(47)
-		. ,	and no ta				-					0		(47)
	•	•			•			ombi boil	ers) ente	er '0' in (47)			
	storage		not nate		1010000	notantai					,			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
-			r storage		ear			(48) x (49)	=			10		(50)
			eclared of	•		or is not		(- / (- /			,	10		(00)
Hot wa	ater stor	age loss	factor fr	om Tabl	e 2 (kW	h/litre/da	ıy)				0.	02		(51)
	•	-	see secti	on 4.3										
		from Ta									1.	03		(52)
Tempe	erature f	actor fro	m Table	2b							0	.6		(53)

			r storage	e, kWh/y	ear			(47) x (51) x (52) x (53) =	1.	.03	(54	I)
Enter	(50) or	(54) in (8	55)								1.	.03	(55	i)
Water	storage	loss cal	culated	for each	month			((56)m =	(55) × (41)	m			_	
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(56	5)
If cylinde	er contain	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – ((H11)] ÷ (5	0), else (5	57)m = (56)	m where (H11) is fro	om Append	lix 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	')
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3							0	(58	3)
Primar	y circuit	loss cal	lculated	for each	month (59)m =	(58) ÷ 36	65 × (41))m				•	
(mo	dified by	/ factor f	rom Tab	le H5 if t	there is s	solar wa	ter heati	ng and a	a cylinde	r thermo	stat)	i		
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 3	65 × (41)m					_	
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)
Total h	neat req	uired for	water h	eating ca	alculated	l for eac	h month	(62)m =	= 0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	213.18	188.03	197.78	177.73	174.49	156.36	150.6	164.66	164.19	184.28	194.31	208.19	(62	2)
Solar DI	HW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter 'C)' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	l 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	3)
Output	t from w	ater hea	iter											
(64)m=	213.18	188.03	197.78	177.73	174.49	156.36	150.6	164.66	164.19	184.28	194.31	208.19		
								Out	put from w	ater heate	r (annual) ₁	12	2173.8 (64	+)
Heat g	ains fro	m water	heating,	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	n + (61)n	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	96.72	85.86	91.6	84.1	83.86	77	75.92	80.59	79.6	87.11	89.62	95.07	(65	;)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	leating	
5. Int	ternal ga	ains (see	e Table 5	5 and 5a):									
Metab	olic gair	ns (Table	<u>e 5), Wat</u>	ts									1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		131.78			1		131.78	131.78		131.78	131.78	131.78	(66	5)
-		· · · · · · · · · · · · · · · · · · ·	ted in Ap	· · · · · ·	1	I	1	· · · · · ·	1			1	1	
(67)m=	21.63	19.21	15.62	11.83	8.84	7.46	8.06	10.48	14.07	17.87	20.85	22.23	(67	')
		r ·	1	· · ·		r	1	, 1	o see Ta	r			1	
(68)m=	240.41	242.91	236.62	223.24	206.34	190.47	179.86	177.36	183.65	197.03	213.93	229.81	(68	3)
Cookir	ng gains	<u>`</u>	i		· · ·	i	· · · · · ·), also s	ee Table					
(69)m=	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	(69))
Pumps	s and fa	ns gains	(Table s	5a)										
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70))
Losses	s e.g. e\	vaporatio	on (nega	tive valu	es) (Tab	ole 5)								
(71)m=	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	(71)
Water	heating	gains (1	Table 5)		•		•							
(72)m=	130	127.77	123.12	116.81	112.71	106.94	102.04	108.32	110.56	117.09	124.47	127.78	(72	<u>?</u>)
Total i	internal	gains =				(66))m + (67)m	n + (68)m	+ (69)m +	(70)m + (7	1)m + (72))m		
(73)m=	454.58	452.42	437.9	414.41	390.43	367.41	352.5	358.7	370.81	394.52	421.78	442.35	(73	3)
6. So	lar gains	S:												

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	0.91	×	11.28	×	0.4	x	0.8	=	4.55	(75)
Northeast 0.9x	0.77	x	2.01	x	11.28	x	0.4	x	0.8	=	5.03	(75)
Northeast 0.9x	0.77	x	0.91	×	22.97	×	0.4	x	0.8	=	9.27	(75)
Northeast 0.9x	0.77	x	2.01	x	22.97	x	0.4	x	0.8	=	10.24	(75)
Northeast 0.9x	0.77	x	0.91	x	41.38	x	0.4	x	0.8	=	16.7	(75)
Northeast 0.9x	0.77	x	2.01	×	41.38	×	0.4	x	0.8	=	18.44	(75)
Northeast 0.9x	0.77	x	0.91	x	67.96	x	0.4	x	0.8	=	27.43	(75)
Northeast 0.9x	0.77	x	2.01	×	67.96	x	0.4	x	0.8	=	30.29	(75)
Northeast 0.9x	0.77	x	0.91	×	91.35	x	0.4	x	0.8	=	36.87	(75)
Northeast 0.9x	0.77	x	2.01	×	91.35	x	0.4	x	0.8	=	40.72	(75)
Northeast 0.9x	0.77	x	0.91	x	97.38	x	0.4	x	0.8	=	39.3	(75)
Northeast 0.9x	0.77	x	2.01	×	97.38	×	0.4	x	0.8	=	43.41	(75)
Northeast 0.9x	0.77	x	0.91	×	91.1	x	0.4	x	0.8	=	36.77	(75)
Northeast 0.9x	0.77	x	2.01	×	91.1	×	0.4	x	0.8	=	40.61	(75)
Northeast 0.9x	0.77	x	0.91	×	72.63	x	0.4	x	0.8	=	29.31	(75)
Northeast 0.9x	0.77	x	2.01	×	72.63	x	0.4	x	0.8	=	32.37	(75)
Northeast 0.9x	0.77	x	0.91	×	50.42	×	0.4	x	0.8	=	20.35	(75)
Northeast 0.9x	0.77	x	2.01	×	50.42	x	0.4	x	0.8	=	22.47	(75)
Northeast 0.9x	0.77	x	0.91	×	28.07	x	0.4	x	0.8	=	11.33	(75)
Northeast 0.9x	0.77	x	2.01	x	28.07	x	0.4	x	0.8	=	12.51	(75)
Northeast 0.9x	0.77	x	0.91	×	14.2	x	0.4	x	0.8	=	5.73	(75)
Northeast 0.9x	0.77	x	2.01	x	14.2	x	0.4	x	0.8	=	6.33	(75)
Northeast 0.9x	0.77	x	0.91	×	9.21	×	0.4	x	0.8	=	3.72	(75)
Northeast 0.9x	0.77	x	2.01	×	9.21	×	0.4	x	0.8	=	4.11	(75)
Southeast 0.9x		x	5.95	×	36.79	×	0.4	x	0.8	=	48.55	(77)
Southeast 0.9x	0.77	x	2.9	×	36.79	×	0.4	x	0.8	=	23.66	(77)
Southeast 0.9x	-	x	2.01	x	36.79	x	0.4	x	0.8	=	16.4	(77)
Southeast 0.9x	0.77	x	5.95	×	62.67	×	0.4	x	0.8	=	82.7	(77)
Southeast 0.9x	0.77	x	2.9	×	62.67	×	0.4	x	0.8	=	40.31	(77)
Southeast 0.9x		x	2.01	×	62.67	x	0.4	x	0.8	=	27.94	(77)
Southeast 0.9x		x	5.95	×	85.75	×	0.4	x	0.8	=	113.15	(77)
Southeast 0.9x	0.77	x	2.9	×	85.75	×	0.4	x	0.8	=	55.15	(77)
Southeast 0.9x	-	x	2.01	×	85.75	x	0.4	x	0.8	=	38.22	(77)
Southeast 0.9x		x	5.95	×	106.25	×	0.4	x	0.8	=	140.2	(77)
Southeast 0.9x	0.77	x	2.9	×	106.25	×	0.4	x	0.8	=	68.33	(77)
Southeast 0.9x	0.1.1	x	2.01	×	106.25	×	0.4	x	0.8	=	47.36	(77)
Southeast 0.9x		x	5.95	×	119.01	×	0.4	x	0.8	=	157.03	(77)
Southeast 0.9x	_	x	2.9	×	119.01	×	0.4	x	0.8	=	76.54	(77)
Southeast 0.9x	0.77	x	2.01	×	119.01	x	0.4	x	0.8	=	53.05	(77)

		-		1		1		_				_
Southeast 0.9x	0.77	X	5.95	x	118.15	x	0.4	×	0.8	=	155.9	(77)
Southeast 0.9x	0.77	x	2.9	x	118.15	x	0.4	x	0.8	=	75.98	(77)
Southeast 0.9x	0.77	x	2.01	x	118.15	x	0.4	X	0.8	=	52.66	(77)
Southeast 0.9x	0.77	x	5.95	x	113.91	x	0.4	x	0.8	=	150.3	(77)
Southeast 0.9x	0.77	x	2.9	x	113.91	x	0.4	x	0.8	=	73.26	(77)
Southeast 0.9x	0.77	x	2.01	x	113.91	x	0.4	x	0.8	=	50.77	(77)
Southeast 0.9x	0.77	x	5.95	x	104.39	x	0.4	x	0.8	=	137.74	(77)
Southeast 0.9x	0.77	x	2.9	x	104.39	x	0.4	x	0.8	=	67.13	(77)
Southeast 0.9x	0.77	x	2.01	x	104.39	x	0.4	x	0.8	=	46.53	(77)
Southeast 0.9x	0.77	x	5.95	x	92.85	x	0.4	x	0.8	=	122.52	(77)
Southeast 0.9x	0.77	x	2.9	x	92.85	x	0.4	x	0.8	=	59.71	(77)
Southeast 0.9x	0.77	x	2.01	x	92.85	x	0.4	x	0.8	=	41.39	(77)
Southeast 0.9x	0.77	x	5.95	x	69.27	x	0.4	x	0.8	=	91.4	(77)
Southeast 0.9x	0.77	x	2.9	x	69.27	x	0.4	x	0.8	=	44.55	(77)
Southeast 0.9x	0.77	x	2.01	x	69.27	x	0.4	x	0.8	=	30.88	(77)
Southeast 0.9x	0.77	x	5.95	x	44.07	x	0.4	x	0.8	=	58.15	(77)
Southeast 0.9x	0.77	x	2.9	x	44.07	x	0.4	x	0.8	=	28.34	(77)
Southeast 0.9x	0.77	x	2.01	x	44.07	x	0.4	x	0.8	=	19.64	(77)
Southeast 0.9x	0.77	×	5.95	×	31.49	x	0.4	x	0.8	=	41.55	(77)
Southeast 0.9x	0.77	x	2.9	×	31.49	x	0.4	x	0.8	=	20.25	(77)
Southeast 0.9x	0.77	x	2.01	×	31.49	x	0.4	x	0.8	=	14.04	(77)
Northwest 0.9x	0.77	x	0.9	×	11.28	x	0.4	x	0.8	=	2.25	(81)
Northwest 0.9x	0.77	x	0.9	x	22.97	x	0.4	x	0.8	=	4.58	(81)
Northwest 0.9x	0.77	x	0.9	x	41.38	x	0.4	x	0.8	=	8.26	(81)
Northwest 0.9x	0.77	x	0.9	x	67.96	x	0.4	x	0.8	=	13.56	(81)
Northwest 0.9x	0.77	x	0.9	x	91.35	x	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	x	0.9	×	97.38	x	0.4	x	0.8	=	19.44	(81)
Northwest 0.9x	0.77	x	0.9	×	91.1	x	0.4	x	0.8	=	18.18	(81)
Northwest 0.9x	0.77	x	0.9	x	72.63	x	0.4	x	0.8	=	14.5	(81)
Northwest 0.9x	0.77	x	0.9	×	50.42	x	0.4	x	0.8	=	10.06	(81)
Northwest 0.9x	0.77	x	0.9	×	28.07	x	0.4	x	0.8	=	5.6	(81)
Northwest 0.9x	0.77	x	0.9	×	14.2	x	0.4	x	0.8	=	2.83	(81)
Northwest 0.9x	0.77	x	0.9	x	9.21	x	0.4	×	0.8	=	1.84	(81)
-		-		•		•						
Solar gains in	watts, calcul	ated	for each mon	th		(83)m	n = Sum(74)m	(82)m				
(83)m= 100.45	175.03 249	9.92	327.17 382.43	3 3	86.69 369.89	327	.59 276.5	196.20	6 121.03	85.5		(83)
Total gains – i	nternal and s	solar	(84)m = (73)n	n + (83)m, watts							
(84)m= 555.03	627.45 687	7.83	741.58 772.8	6 7	754.1 722.38	686	.29 647.31	590.78	3 542.81	527.84		(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C)

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

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

21

(85)

(86)m=	1	0.99	0.98	0.95	0.84	0.64	0.47	0.51	0.77	0.96	0.99	1		(86)
Mean	internal	temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	20.15	20.28	20.48	20.73	20.91	20.99	21	21	20.96	20.73	20.4	20.13		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	able 9, T	h2 (°C)					
(88)m=	20.18	20.19	20.19	20.2	20.2	20.21	20.21	20.22	20.21	20.2	20.2	20.19		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	ee Table	9a)						
(89)m=	1	0.99	0.98	0.93	0.79	0.56	0.38	0.42	0.7	0.94	0.99	1		(89)
Mean	internal	temper	ature in	the rest	of dwelli	ing T2 (f	ollow ste	eps 3 to 3	7 in Tabl	e 9c)				
(90)m=	19.04	19.24	19.53	19.89	20.12	20.21	20.21	20.22	20.18	, 19.9	19.42	19.02		(90)
I									f	LA = Livin	g area ÷ (4	4) =	0.31	(91)
Mean	internal	temper	ature (fo	or the wh	ole dwe	llina) = f	LA x T1	+ (1 – fL	A) x T2			I		
(92)m=	19.39	19.57	19.83	20.15	20.37	20.45	20.46	20.46	20.43	20.16	19.73	19.37		(92)
Apply	adjustm	nent to tl	he mear	n internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.39	19.57	19.83	20.15	20.37	20.45	20.46	20.46	20.43	20.16	19.73	19.37		(93)
8. Spa	ace hea	ting requ	uirement	t										
						ned at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	i i	Feb	Mar	using Ta		lun	1.1	A.u.a	San	Oct	Nov	Dee		
l Itilies	Jan tion fac	tor for g		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	1	0.99	0.98	0.93	0.8	0.59	0.41	0.45	0.72	0.94	0.99	1		(94)
	l gains,	hmGm .	W = (94	۱ 4)m x (8	L 4)m									
(95)m=	552.68	621.5	671.08	686.8	, 618.33	442.17	295.38	309.33	465.9	556.88	537.36	526.17		(95)
Month	nly avera	age exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an interr	al tempe	erature,	Lm,W:	=[(39)m :	x [(93)m	– (96)m]				
(97)m=		1168.18	1058.3	879.47	675.35	448.58	295.92	310.31	488.06	744.8	989.87	1196.76		(97)
•		• •		or each n		1	1		í Ì	<u>í - `</u>	ŕ			
(98)m=	485.91	367.37	288.09	138.72	42.43	0	0	0	0	139.82	325.8	498.92		1
								Tota	l per year	(kWh/year	[.]) = Sum(9	8)15,912 =	2287.06	(98)
Space	e heating	g require	ement in	kWh/m ²	/year								25.21	(99)
9b. En	ergy req	luiremer	nts – Coi	mmunity	heating	scheme)							
				ating, spa		•		•••			unity sch	neme.		land
				condary			-	(Table 1	1) '0' if n	one			0	(301)
Fractio	n of spa	ice heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-	-								up to four o	other heat	sources; tl	ne latter	
			-	mal and wa ity heat		rom powe	r stations.	See Appel	naix C.			[1	(303a)
				m Comn		eat pumi	n			(3	02) x (303	a) =	1	(304a)
				method	-			inity hea	atina svs		02) // (000	~/	1	(305)
				12c) for c		,			ang byb					(306)
				20/1010	Jonnuli	ity neath	ng syste					l	1.05	
-	heating space) heating	requiren	nent								[kWh/year 2287.06	1
	5,000	y										l	2201.00	J

Space heat from Community heat pump	(98) x (304a) x	(305) x (306) =	2401.41	(307a)
Efficiency of secondary/supplementary heating system in % (from	Table 4a or Appen	dix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement			2173.8	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x	(305) x (306) =	2282.49	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	e) + (310a)(310e)] =	46.84	(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		221.13	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	o) + (330g) =	221.13	(331)
Energy for lighting (calculated in Appendix L)			381.95	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (33	2)(237b) =	5286.99	(338)
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	383	(367a)
CO2 associated with heat source 1 [(307b)+(310	0b)] x 100 ÷ (367b) x	0.52	634.71	(367)
Electrical energy for heat distribution [(31	3) x	0.52	24.31	(372)
Total CO2 associated with community systems (363	3)(366) + (368)(372	2) =	659.02	(373)
CO2 associated with space heating (secondary) (309)) x	0 =	0	(374)
CO2 associated with water from immersion heater or instantaneous	s heater (312) x	0.22	0	(375)
Total CO2 associated with space and water heating (373	3) + (374) + (375) =		659.02	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x	0.52 =	114.77	(378)
CO2 associated with electricity for lighting (332	2))) ×	0.52	198.23	(379)
Total CO2, kg/year sum of (376)(382) =			972.02	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			10.71	(384)
El rating (section 14)			90.4	(385)

User Details:												
Assessor Name:	Ben Talbutt			Strom	a Num	ber:		STRO	0036639			
Software Name:	Stroma FSAF	P 2012		Softwa	are Ver	sion:		Versio	on: 1.0.5.17			
		Р	roperty /	Address:	D2-04							
Address :												
1. Overall dwelling dimen	sions:											
Ground floor			-	a(m²) 0.73	(1a) x	Av. He i	i ght(m) .62	(2a) =	Volume(m ³) 237.71	(3a)		
Total floor area TFA = (1a)	+(1b)+(1c)+(1d	l)+(1e)+(1r	ı) 9	0.73	(4)							
Dwelling volume			L		(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	237.71	(5)		
2. Ventilation rate:									<u> </u>			
Number of chimneys Number of open flues	main heating	secondar heating + 0 + 0	y] + [_] + [_	0 0] = [total 0 0		40 = 20 =	m ³ per hour	(6a) (6b)		
Number of intermittent fan				-		3	x ^	10 =	30	_`´´](7a)		
Number of passive vents								10 =				
					Ļ	0			0	(7b)		
Number of flueless gas fire	S				L	0	X 4	40 =	0	(7c)		
								Air ch	anges per ho	ur		
Infiltration due to chimneys						30		÷ (5) =	0.13	(8)		
If a pressurisation test has been been as a factor of the second se		intended, procee	d to (17), c	otherwise o	continue fro	om (9) to ((16)					
Number of storeys in the Additional infiltration	e aweiling (ns)						[(9).	-1]x0.1 =	0	(9) (10)		
Structural infiltration: 0.2	5 for steel or tin	nber frame or	0.35 for	masonr	v constr	uction	[(0)	1,00.1 -	0	(10)		
if both types of wall are pre deducting areas of opening	sent, use the value s); if equal user 0.3	corresponding to 85	the greate	er wall area	a (after							
If suspended wooden flo		,	1 (seale	d), else	enter 0				0	(12)		
If no draught lobby, ente									0	(13)		
Percentage of windows	and doors drau	ght stripped		0.25 - [0.2	$x(14) \cdot 1$	001 -			0	(14)		
Window infiltration Infiltration rate				(8) + (10) ·		-	⊧ (15) –		0	(15)		
Air permeability value, q	50 expressed i	n cubic metre						area	0	(16) (17)		
If based on air permeability	•		•	•	•		molopo	aioa	0.38	(17)		
Air permeability value applies						is being us	sed		0.00			
Number of sides sheltered									2	(19)		
Shelter factor				(20) = 1 - [9)] =			0.85	(20)		
Infiltration rate incorporatir	-			(21) = (18)) x (20) =				0.32	(21)		
Infiltration rate modified for		· · · · · · · · · · · · · · · · · · ·			-			_	1			
		May Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind spe									1			
(22)m= 5.1 5 4	.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7				
Wind Factor (22a)m = (22)	m ÷ 4											
(22a)m= 1.27 1.25 1.	23 1.1 1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18				

Adjust	ed infiltra	ation rat	e (allow	ing for sł	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
	0.41	0.4	0.39	0.35	0.34	0.3	0.3	0.3	0.32	0.34	0.36	0.38		
			-	rate for t	he appli	cable ca	se			•	-			
	echanica			andin NL (0	0h) (00)	.)				(22-)			0	(23a)
				endix N, (2)) = (23a)			0	(23b)
				ciency in %	-								0	(23c)
	r		· · · · · ·	entilation			r	1	ŕ	1 `	1	i	÷100]	(24-)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
	r		· · · · · ·	entilation			r	T	ŕ	T · · ·	, I		I	(2.41.)
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
				ntilation of	-	-				F (00)	`			
	<u> </u>		· ·	then (24		1	· · ·	1	r i	1	i i i i i i i i i i i i i i i i i i i		l	(240)
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,				nole hous)m = (22l		•				0.5]				
(24d)m=	0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(24d)
Effe	ctive air o	change	rate - e	nter (24a) or (24l	o) or (24	c) or (24	ld) in bo	x (25)	-		-		
(25)m=	0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(25)
2 40	at losso	and he		paramete	or:	•								
ELEN		Gros	SS	Openin	gs	Net Ar		U-val		AXU		k-value		A X k
_		area	(m²)	r	2	A ,r	n²	W/m2	2K	(W/	K)	kJ/m²∙ł	<	kJ/K
Doors						2.52			=	2.52				(26)
Windo	ws Type	1				0.91	x1	/[1/(1.4)+	- 0.04] =	1.21				(27)
Windo	ws Type	2				2.01	x1	/[1/(1.4)+	- 0.04] =	2.66				(27)
Windo	ws Type	3				5.95	x1	/[1/(1.4)+	- 0.04] =	7.89				(27)
Windo	ws Type	4				2.9	x1	/[1/(1.4)+	- 0.04] =	3.84				(27)
Windo	ws Type	5				2.01	x1	/[1/(1.4)+	- 0.04] =	2.66				(27)
Windo	ws Type	6				0.9		/[1/(1.4)+	- 0.04] =	1.19	=			(27)
Floor						47.27	7 X	0.13	=	6.1451	Ξ r			(28)
Walls ⁻	Type1	59.0)4	18.1	1	40.93	x	0.18		7.37	= i		\dashv	(29)
Walls -	Type2	6.5	5	0		6.55	x	0.18		1.18	= 1		= =	(29)
Walls -		27.5		0		27.56		0.18		4.96	= 1		\dashv	(29)
Roof		9.3		0		9.35		0.13		1.22	╡╏		\dashv	(30)
	rea of el			0				0.13		1.22	L			
		ements	, 111-			149.7					— , r			(31)
Party v				- 66		23.27		0	=	0				(32)
				effective wi nternal wal			ated using	g tormula 1	1/[(1/U-valt	ue)+0.04] a	as given in	paragraph	1 3.2	
Fabric	Fabric heat loss, W/K = S (A x U)							(26)(30) + (32) =				44.06	; (33)
Heat c	Heat capacity Cm = S(A x k)								((28).	(30) + (32	2) + (32a).	(32e) =	0	(34)
Thorm	al mass	parame	ter (TM	P = Cm +	- TFA) ir	n kJ/m²K Indicative Value: Medium						250	(35)	

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

can be u	ised inste	ad of a de	tailed calcu	ulation.										
Therma	Thermal bridges : S (L x Y) calculated using Appendix K											13.7	(36)	
			are not kn	own (36) =	= 0.05 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			57.76	(37)
Ventila	tion hea	at loss ca	alculated	l monthly	/		-		(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	45.74	45.49	45.24	44.08	43.86	42.84	42.84	42.65	43.23	43.86	44.3	44.76		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	103.5	103.25	103	101.83	101.62	100.6	100.6	100.41	100.99	101.62	102.06	102.52		
Heat In	ss nara	meter (F	· HLP), W/	m²k						Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	101.83	(39)
(40)m=	1.14	1.14	1.14	1.12	1.12	1.11	1.11	1.11	1.11	1.12	1.12	1.13		
(40)11-	1.14	1.14	1.14	1.12	1.12	1.11	1.11	1.11					1.12	(40)
Numbe	er of day	/s in mo	nth (Tab	le 1a)						-verage =	Sum(40) _{1.}	12 / 12=	1.12	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
			-								-			
4. Wa	iter hea	tina ene	rgy requi	rement:								kWh/ye	ear:	
		ipancy, I		14	(40 (T	- 40.0					64		(42)
	A > 13. A £ 13.		+ 1.76 x	[1 - exp	(-0.0003	49 X (1F	-A -13.9)2)] + 0.0	JU13 X (IFA -13.	.9)			
		,	ater usag	ae in litre	s per da	iv Vd.av	erage =	(25 x N)	+ 36		96	5.8		(43)
Reduce	the annua	al average	hot water	usage by a	5% if the d	welling is	designed t			se target o				(- /
not more	e that 125	litres per	person per	day (all w	ater use, h	not and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = factors	ctor from T	Table 1c x	(43)						
(44)m=	106.47	102.6	98.73	94.86	90.99	87.12	87.12	90.99	94.86	98.73	102.6	106.47		
I											m(44) ₁₁₂ =		1161.54	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D	0Tm / 3600) kWh/mor	oth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	157.9	138.1	142.51	124.24	119.21	102.87	95.32	109.39	110.69	129	140.82	152.92		
16					h - 1 1 - 1 -			L		Total = Su	m(45) ₁₁₂ =	:	1522.96	(45)
1		ater neatil	ng at point	or use (no		storage),		boxes (46)) to (61)				I	
(46)m= Water	23.68 storage	20.71	21.38	18.64	17.88	15.43	14.3	16.41	16.6	19.35	21.12	22.94		(46)
	-) includin	a any se	olar or W	/WHRS	storage	within sa	me ves	امع		150		(47)
0		,	and no ta	0 1			0			501		150		(47)
	•	-	hot wate		-			• •	ers) ente	er 'O' in (47)			
	storage		not wate			lotantai	10000 00			, o (,			
	•		eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Tempe	rature f	actor fro	m Table	2b							0	54		(49)
Energy lost from water storage, kWh/year $(48) \times (49) = 0.75$												(50)		
b) If manufacturer's declared cylinder loss factor is not known:											(00)			
,			factor fr	•								0		(51)
	•	-	ee secti	on 4.3										
		from Ta										0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)

Energy lost from water storage, kWh/year								(47) x (51)) x (52) x (53) =	0]	(54)
Enter	(50) or	(54) in (5	55)								0.	75		(55)
Water	storage	loss cal	culated	for 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 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	lix 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)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mo	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41)m					_	
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	neat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	204.49	180.18	189.1	169.33	165.81	147.96	141.92	155.98	155.78	175.6	185.91	199.51		(62)
Solar DI	HW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter		-	-	-		-	-	-	-	_	
(64)m=	204.49	180.18	189.1	169.33	165.81	147.96	141.92	155.98	155.78	175.6	185.91	199.51		_
								Outp	out from wa	ater heate	r (annual)₁	12	2071.58	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	89.78	79.59	84.66	77.38	76.91	70.28	68.97	73.65	72.88	80.17	82.89	88.12		(65)
inclu	ude (57)	m in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Int	ternal ga	ains (see	e Table 5	5 and 5a):									
Metab	olic gair	ns (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	131.78	131.78	131.78	131.78	131.78	131.78	131.78	131.78	131.78	131.78	131.78	131.78		(66)
Lightin	g gains	(calcula	ted in A	opendix	L, equat	ion L9 o	r L9a), a	lso see [·]	Table 5					
(67)m=	22.06	19.6	15.94	12.07	9.02	7.61	8.23	10.69	14.35	18.23	21.27	22.68		(67)
Applia	nces ga	ins (calc	ulated ir	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	240.41	242.91	236.62	223.24	206.34	190.47	179.86	177.36	183.65	197.03	213.93	229.81		(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equat	ion L15	or L15a)), also se	ee Table	5			•	
(69)m=	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18	36.18		(69)
Pumps	s and fa	ns gains	(Table :	5a)									•	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	s e.g. ev	, aporatic	n (nega	tive valu	es) (Tab	le 5)								
(71)m=	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42	-105.42		(71)
Water	heating	gains (T	able 5)	•	•		•	•	•				I	
(72)m=	120.67	118.43	, 113.79	107.48	103.38	97.61	92.7	98.99	101.22	107.75	115.13	118.44		(72)
Total i	internal	gains =				(66)	m + (67)m	• n + (68)m -	⊦ (69)m + ((70)m + (7	1)m + (72)	m	I	
(73)m=	448.68	446.47	431.88	408.31	384.28	361.22	346.32	352.58	364.76	388.55	415.86	436.46		(73)
6. <u>S</u> o	lar gains	s:		•	•		•	•						

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	0.91	×	11.28	×	0.63	x	0.7	=	6.28	(75)
Northeast 0.9x	0.77	x	2.01	×	11.28	x	0.63	x	0.7	=	6.93	(75)
Northeast 0.9x	0.77	x	0.91	×	22.97	x	0.63	x	0.7	=	12.77	(75)
Northeast 0.9x	0.77	x	2.01	×	22.97	x	0.63	x	0.7	=	14.11	(75)
Northeast 0.9x	0.77	x	0.91	×	41.38	x	0.63	x	0.7	=	23.02	(75)
Northeast 0.9x	0.77	x	2.01	×	41.38	×	0.63	x	0.7	=	25.42	(75)
Northeast 0.9x	0.77	x	0.91	×	67.96	x	0.63	x	0.7	=	37.8	(75)
Northeast 0.9x	0.77	x	2.01	×	67.96	×	0.63	x	0.7	=	41.74	(75)
Northeast 0.9x	0.77	x	0.91	×	91.35	x	0.63	x	0.7	=	50.81	(75)
Northeast 0.9x	0.77	x	2.01	×	91.35	x	0.63	x	0.7	=	56.11	(75)
Northeast 0.9x	0.77	x	0.91	x	97.38	×	0.63	x	0.7	=	54.17	(75)
Northeast 0.9x	0.77	x	2.01	×	97.38	×	0.63	x	0.7	=	59.82	(75)
Northeast 0.9x	0.77	x	0.91	x	91.1	x	0.63	x	0.7	=	50.67	(75)
Northeast 0.9x	0.77	x	2.01	×	91.1	×	0.63	x	0.7	=	55.96	(75)
Northeast 0.9x	0.77	x	0.91	×	72.63	x	0.63	x	0.7	=	40.4	(75)
Northeast 0.9x	0.77	x	2.01	×	72.63	×	0.63	x	0.7	=	44.61	(75)
Northeast 0.9x	0.77	x	0.91	x	50.42	x	0.63	x	0.7	=	28.04	(75)
Northeast 0.9x	0.77	x	2.01	×	50.42	×	0.63	x	0.7	=	30.97	(75)
Northeast 0.9x	0.77	x	0.91	×	28.07	x	0.63	x	0.7	=	15.61	(75)
Northeast 0.9x	0.77	x	2.01	x	28.07	x	0.63	x	0.7	=	17.24	(75)
Northeast 0.9x	0.77	x	0.91	×	14.2	x	0.63	x	0.7	=	7.9	(75)
Northeast 0.9x	0.77	x	2.01	×	14.2	×	0.63	x	0.7	=	8.72	(75)
Northeast 0.9x	0.77	x	0.91	×	9.21	×	0.63	x	0.7	=	5.13	(75)
Northeast 0.9x	0.77	x	2.01	×	9.21	×	0.63	x	0.7	=	5.66	(75)
Southeast 0.9x	0.77	x	5.95	x	36.79	x	0.63	x	0.7	=	66.91	(77)
Southeast 0.9x	0.77	x	2.9	×	36.79	×	0.63	x	0.7	=	32.61	(77)
Southeast 0.9x	0.77	x	2.01	×	36.79	x	0.63	x	0.7	=	22.6	(77)
Southeast 0.9x	0.77	x	5.95	×	62.67	x	0.63	x	0.7	=	113.97	(77)
Southeast 0.9x	0.77	x	2.9	×	62.67	x	0.63	x	0.7	=	55.55	(77)
Southeast 0.9x	0.77	x	2.01	×	62.67	x	0.63	x	0.7	=	38.5	(77)
Southeast 0.9x	0.77	x	5.95	×	85.75	x	0.63	x	0.7	=	155.93	(77)
Southeast 0.9x	0.77	x	2.9	×	85.75	x	0.63	x	0.7	=	76	(77)
Southeast 0.9x	0.77	x	2.01	×	85.75	×	0.63	x	0.7	=	52.68	(77)
Southeast 0.9x	0.77	x	5.95	×	106.25	×	0.63	x	0.7	=	193.21	(77)
Southeast 0.9x	0.77	x	2.9	×	106.25	x	0.63	x	0.7	=	94.17	(77)
Southeast 0.9x		x	2.01	×	106.25	×	0.63	x	0.7	=	65.27	(77)
Southeast 0.9x		x	5.95	×	119.01	×	0.63	x	0.7	=	216.41	(77)
Southeast 0.9x		x	2.9	×	119.01	×	0.63	x	0.7	=	105.48	(77)
Southeast 0.9x	0.77	x	2.01	x	119.01	x	0.63	x	0.7	=	73.11	(77)

		_		_								
Southeast 0.9x	0.77	x	5.95	x	118.15	x	0.63	x	0.7	=	214.84	(77)
Southeast 0.9x	0.77	x	2.9	x	118.15	x	0.63	×	0.7	=	104.71	(77)
Southeast 0.9x	0.77	x	2.01	x	118.15	x	0.63	x	0.7	=	72.58	(77)
Southeast 0.9x	0.77	x	5.95	x	113.91	x	0.63	×	0.7	=	207.13	(77)
Southeast 0.9x	0.77	x	2.9	x	113.91	x	0.63	x	0.7	=	100.96	(77)
Southeast 0.9x	0.77	x	2.01	x	113.91	x	0.63	x	0.7	=	69.97	(77)
Southeast 0.9x	0.77	x	5.95	x	104.39	x	0.63	x	0.7	=	189.82	(77)
Southeast 0.9x	0.77	x	2.9	x	104.39	x	0.63	x	0.7	=	92.52	(77)
Southeast 0.9x	0.77	x	2.01	x	104.39	x	0.63	x	0.7	=	64.13	(77)
Southeast 0.9x	0.77	x	5.95	x	92.85	x	0.63	x	0.7	=	168.84	(77)
Southeast 0.9x	0.77	x	2.9	x	92.85	x	0.63	x	0.7	=	82.29	(77)
Southeast 0.9x	0.77	x	2.01	x	92.85	x	0.63	x	0.7	=	57.04	(77)
Southeast 0.9x	0.77	x	5.95	x	69.27	x	0.63	x	0.7	=	125.96	(77)
Southeast 0.9x	0.77	x	2.9	x	69.27	x	0.63	x	0.7	=	61.39	(77)
Southeast 0.9x	0.77	x	2.01	×	69.27	x	0.63	×	0.7	=	42.55	(77)
Southeast 0.9x	0.77	x	5.95	×	44.07	x	0.63	x	0.7	=	80.14	(77)
Southeast 0.9x	0.77	x	2.9	x	44.07	x	0.63	x	0.7	=	39.06	(77)
Southeast 0.9x	0.77	x	2.01	×	44.07	x	0.63	×	0.7	=	27.07	(77)
Southeast 0.9x	0.77	x	5.95	×	31.49	x	0.63	x	0.7	=	57.26	(77)
Southeast 0.9x	0.77	x	2.9	x	31.49	x	0.63	x	0.7	=	27.91	(77)
Southeast 0.9x	0.77	x	2.01	x	31.49	x	0.63	x	0.7	=	19.34	(77)
Northwest 0.9x	0.77	x	0.9	×	11.28	x	0.63	×	0.7	=	3.1	(81)
Northwest 0.9x	0.77	x	0.9	x	22.97	x	0.63	x	0.7	=	6.32	(81)
Northwest 0.9x	0.77	x	0.9	x	41.38	x	0.63	x	0.7	=	11.38	(81)
Northwest 0.9x	0.77	x	0.9	×	67.96	x	0.63	x	0.7	=	18.69	(81)
Northwest 0.9x	0.77	x	0.9	x	91.35	x	0.63	x	0.7	_ =	25.12	(81)
Northwest 0.9x	0.77	x	0.9	×	97.38	x	0.63	x	0.7	= =	26.79	(81)
Northwest 0.9x	0.77	x	0.9	×	91.1	x	0.63	x	0.7	= =	25.06	(81)
Northwest 0.9x	0.77	x	0.9	×	72.63	x	0.63	x	0.7	=	19.98	(81)
Northwest 0.9x	0.77	x	0.9	×	50.42	x	0.63	x	0.7	= =	13.87	(81)
Northwest 0.9x	0.77	x	0.9	x	28.07	x	0.63	x	0.7	=	7.72	(81)
Northwest 0.9x	0.77	x	0.9	x	14.2	x	0.63	x	0.7	=	3.9	(81)
Northwest 0.9x	0.77	x	0.9	×	9.21	x	0.63	×	0.7	=	2.53	(81)
Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$												
	(83)m = 138.43 241.21 344.42 450.88 527.04 532.91 509.75 451.45 381.06 270.47 166.79 117.83											
Total gains – in						1 -31		210.4	100.13		I	(00)
			(04) = (73)								1	

7. Mean internal temperature (heating season)

859.19

776.31

587.11

(84)m=

687.68

Temperature during heating periods in the living area from Table 9, Th1 (°C)

911.31

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

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

856.07

804.03

745.82

659.02

582.66

554.28

894.13

21

(84)

(85)

(86)m=	1	0.99	0.98	0.95	0.85	0.68	0.51	0.56	0.81	0.96	0.99	1		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	7 in Tabl	e 9c)					
(87)m=	19.81	19.98	20.24	20.56	20.82	20.96	20.99	20.99	20.9	20.56	20.13	19.79		(87)
Temp	erature	durina h	eating p	eriods ir	n rest of	dwellina	from Ta	able 9, Tl	h2 (°C)					
(88)m=	19.97	19.97	19.97	19.98	19.98	19.99	19.99	20	19.99	19.98	19.98	19.98		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	1	0.99	0.98	0.93	0.8	0.59	0.4	0.45	0.73	0.95	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ing T2 (fe	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	18.39	18.64	19.01	19.48	19.82	19.97	19.99	19.99	19.91	, 19.48	18.86	18.36		(90)
I									f	LA = Livin	g area ÷ (4	4) =	0.31	(91)
Mean	interna	l temper	ature (fc	or the wh	ole dwe	llina) = fl	LA x T1	+ (1 – fL	A) x T2			ľ		
(92)m=	18.84	19.06	19.4	19.82	20.13	20.28	20.31	20.3	20.22	19.82	19.26	18.81		(92)
Apply	adjustn	nent to t	he mear	internal	l temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.84	19.06	19.4	19.82	20.13	20.28	20.31	20.3	20.22	19.82	19.26	18.81		(93)
8. Spa	ace hea	ting requ	uirement											
						ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut		I	<u> </u>	using Ta	i				0		NL		l	
Litilion	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.99	tor for g	0.97	0.92	0.81	0.61	0.43	0.48	0.75	0.94	0.99	1	l	(94)
				4)m x (84		0.01	0.40	0.40	0.70	0.04	0.00	'		()
(95)m=	584.03	679.64	754.4	793.56	738.28	549.69	369.91	387.08	559.75	622.74	576.12	552.08	l	(95)
Month	nly aver	age exte	rnal tem	perature		able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	- =[(39)m	x [(93)m	– (96)m]				
(97)m=	1504.86	1462.29	1328.69	1111.85	856.85	571.37	372.77	391.98	618.49	937.11	1240.66	1497.29	l	(97)
Space	e heatin	g require	ement fo	r each m	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	685.1	525.94	427.27	229.17	88.22	0	0	0	0	233.89	478.46	703.24		_
								Tota	l per year	(kWh/year	[•]) = Sum(9	8)15,912 =	3371.28	(98)
Space	e heatin	g require	ement in	kWh/m²	²/year								37.16	(99)
9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
Space	e heatir	ng:			Ŭ				,					
Fracti	on of sp	ace hea	at from s	econdar	y/supple	mentary	system						0	(201)
Fracti	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fracti	on of to	tal heatii	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of i	main spa	ace heat	ing syste	em 1							İ	93.5	(206)
Efficie	ency of s	seconda	ry/suppl	ementar	y heatin	g syster	n, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	 ar
Space				alculate			Uui	/ lug	Ocp	000	1107	000	Kvvii/yC	
1	685.1	525.94	427.27	229.17	88.22	0	0	0	0	233.89	478.46	703.24		
(211)m	= {[(98)m x (20	u 4)]}x1	00 ÷ (20		I				I				(211)
、 · · /··	732.73	562.5	456.97	245.1	94.35	0	0	0	0	250.15	511.73	752.12		. /
ļ	I	1	1	1	1	1	1	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3605.65	(211)

Space heating fuel (secondary), kWh/month

opace neatin	•		• •	monur									
= {[(98)m x (20	01)] } x 1	00 ÷ (20	8)	,		1					1	1	
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	al (kWh/yea	ar) =Sum(:	2 15) _{15,101}	2=	0	(215)
Water heating	g												
Output from w		I			i			r			i	1	
204.49	180.18	189.1	169.33	165.81	147.96	141.92	155.98	155.78	175.6	185.91	199.51		_
Efficiency of w	ater hea	ater										79.8	(216)
(217)m= 87.79	87.51	86.92	85.62	83.22	79.8	79.8	79.8	79.8	85.58	87.23	87.9	J	(217)
Fuel for water													
(219)m = (64) (219)m= 232.92) <u>m x 100</u> 205.91) ÷ (217) 217.55	m 197.77	199.25	185.42	177.84	195.47	195.22	205.19	213.13	226.99	1	
(219)11= 232.92	205.91	217.55	197.17	199.25	105.42	177.04		al = Sum(2)		213.13	220.99	2452.64	(219)
Annual totals							1010	– Ourr(2		Mbhaa	-	kWh/year	
Space heating fuel used, main system 1 3605.65													
Water heating			-,									2452.64	
0			alactria	kaan ha	+							2402.04	
Electricity for p			electric	кеер-по	L						-	1	
central heatir											30		(230c)
boiler with a t	fan-assis	sted flue									45		(230e)
Total electricit	y for the	above, l	kWh/yea	r			sum	of (230a)	(230g) =	:		75	(231)
Electricity for I	ighting											389.64	(232)
Total delivered	d energy	for all u	ses (211)(221)	+ (231)	+ (232).	(237b)	=				6522.94	(338)
12a. CO2 em	nissions	– Individ	ual heat	ing syste	ems inclu	uding mi	cro-CHF	C					
					En	ergy			Emiss	ion fac	tor	Emissions	
						/h/year			kg CO			kg CO2/yea	-
Space heating	n (main s	system 1)			1) x			0.2		=	778.82	(261)
Space heating			,			5) x					=		(263)
		uary)				9) x			0.5			0	
Water heating							(000)	(00.4)	0.2	16	=	529.77	(264)
Space and wa		-				1) + (262)	+ (203) + ((∠04) =				1308.59	(265)
Electricity for p	oumps, f	ans and	electric	keep-ho	t (23 ⁻	1) x			0.5	19	=	38.93	(267)
Electricity for I	ighting				(232	2) x			0.5	19	=	202.22	(268)
Total CO2, kg	/year							sum c	of (265)(271) =		1549.74	(272)



25.01 (273)