Regulations Compliance Report

	nt L1A, 2013 Edition ber 2020 at 14:54:5	, England assessed by Strom 2	na FSAP 2012 program, Vei	rsion: 1.0.5.9	
Project Information	n:				
Assessed By:	Zahid Ashraf (STR	O001082)	Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area: 5	1.22m ²	
Site Reference :	Hermitage Lane		Plot Reference:	Plot 16	
Address :	Ũ				
Client Details:					
Name: Address :					
	s itoms included w	thin the SAP calculations.			
•	te report of regulat				
1a TER and DER		• • •			
	ng system: Mains ga	as (c)			
Fuel factor: 1.00 (n	nains gas (c))				
-	xide Emission Rate		19.39 kg/m²		
	ioxide Emission Rat	e (DER)	13.60 kg/m ²		OK
1b TFEE and DF					
-	gy Efficiency (TFEE		47.6 kWh/m ²		
Dwelling Fabric En	ergy Efficiency (DFE	E)	42.8 kWh/m ²		ок
2 Fabric U-value	s				UK
Element	5	Average	Highest		
External v	vall	0.15 (max. 0.30)	0.15 (max. 0.70)		ок
Floor	van	0.12 (max. 0.25)	0.12 (max. 0.70)		OK
Roof		(no roof)			•
Openings		1.40 (max. 2.00)	1.40 (max. 3.30)		ок
2a Thermal bridg	ging		· · · · · · · · · · · · · · · · · · ·		
		om linear thermal transmittan	ices for each junction		
3 Air permeabilit			•		
Air permeat	pility at 50 pascals		3.00 (design val	ne)	
Maximum			10.0		ОК
4 Heating efficie	ncy				
Main Heatin		Community heating scheme	es - mains gas		
		, .	Ū		
Secondary I	heating system:	None			
5 Cylinder insula	otion				
Hot water S		No cylinder			
6 Controls	lorage.				
Space heati	na controls	Charging system linked to u	ise of community beating		
Opace rieal		programmer and at least tw			ок
Hot water co	ontrols:	No cylinder thermostat			
		No cylinder			

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7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.91	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	8.65m ²	
Windows facing: South East	4.58m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m ³ /m ² h	
Floors U-value	0.12 W/m²K	
Floors U-value	0.12 W/m²K	
Community heating, heat from boilers – mains gas		
Photovoltaic array		

			User Det	tails:						
Assessor Name:	Zahid Ashraf		S	stroma	a Num	STRO	001082			
Software Name:	Stroma FSAP 20 ²	12	S	oftwa	re Ver	sion:		Versio	n: 1.0.5.9	
		Pro	operty Ac	ddress:	Plot 16					
Address :										
1. Overall dwelling dimer	nsions:									
			Area(r				ight(m)	1	Volume(m ³)	_
Ground floor			51.2	22	(1a) x	2	2.5	(2a) =	128.04	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e	e)+(1n)	51.2	22	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	128.04	(5)
2. Ventilation rate:										_
		econdary neating	ot	ther		total			m ³ per hour	
Number of chimneys		0	+	0] = [0	x 4	40 =	0	(6a)
Number of open flues		0	+	0		0	x 2	20 =	0	(6b)
Number of intermittent far	IS L				, L Г	0	x 1	0 =	0	 _(7a)
Number of passive vents						0	x 1	0 =	0	 (7b)
Number of flueless gas fir	es					0	x 4	40 =	0](7c)
					L]	A 1 I		_
					_			Air ch	anges per ho	ur —
Infiltration due to chimney						0		÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in th		ea, proceea i	to (17), oth	ierwise c	ontinue fro	om (9) to (16)		0	(9)
Additional infiltration							[(9)-	1]x0.1 =	0	(10)
Structural infiltration: 0.2	25 for steel or timber	frame or C).35 for n	nasonr	/ constr	uction			0	(11)
if both types of wall are pre deducting areas of opening	gs); if equal user 0.35		-							
If suspended wooden fl		led) or 0.1	(sealed)), else e	enter 0				0	(12)
If no draught lobby, ente									0	(13)
Percentage of windows	and doors draught s	tripped		05 10 0		0.01			0	(14)
Window infiltration					x (14) ÷ 1	00] = 2) + (13) -	. (15) -		0	(15)
Infiltration rate Air permeability value, o	750 overcessed in cut	nic motros		· · · ·		<i>·</i> · · <i>·</i>		araa	0	(16)
If based on air permeabilit			•	•			invelope	alea	3	(17) (18)
Air permeability value applies	•					s being u	sed		0.15	
Number of sides sheltered			-		-	-			2	(19)
Shelter factor			(20	20) = 1 - [0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporati	ng shelter factor		(2	21) = (18)	x (20) =				0.13	(21)
Infiltration rate modified for	r monthly wind spee	d								
Jan Feb I	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	ed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22)m ÷ 4									
	.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjuste	ed infiltra	ation rat	e (allow	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				_	
0.1.1	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		al ventila	-	rate for t	ne appli	cable ca	se						0.5	(23a)
				endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)), othei	rwise (23b) = (23a)			0.5	(23b)
lf bala	anced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =	, , ,			79.05	(23c)
a) If	balance	ed mecha	anical ve	entilation	with he	at recove	erv (MVI	HR) (24a	m = (22)	2b)m + ()	23b) x [⁻	1 – (23c)		(200)
(24a)m=		0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25]	(24a)
b) If	balance	d mecha	ı anical ve	ntilation	without	heat rec	coverv (N	u MV) (24b)m = (22	1 2b)m + (;	23b)		1	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If	whole h	ouse ex	tract ver	ntilation of	or positiv	ve input v	ventilatio	on from c	outside				1	
,					•	•		c) = (22b		5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
,						•		on from l 0.5 + [(2		0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	(25)			-		
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25		(25)
3 He	at losse	s and he	at loss	paramet	⊃r.								-	
ELEN		Gros	SS	Openin rr	gs	Net Ar A ,r		U-valı W/m2		A X U (W/ł	<)	k-value kJ/m²·l		X k J/K
Doors			. ,			2	x	1.4		2.8				(26)
Windov	ws Type	e 1				8.651	x1	/[1/(1.4)+	0.04] =	11.47				(27)
Windo	ws Type	2				4.579) x1	/[1/(1.4)+	0.04] =	6.07				(27)
Floor T	Type 1					2.292	2 x	0.12	= [0.27504	 ₄ [(28)
Floor T						48.92	_	0.12		5.87076	=			(28)
Walls ⁻		41.9	4	13.2	3	28.71		0.15		4.31			\dashv	(29)
Walls ⁻		5.6		2		3.62		0.14		0.51	\dashv		\dashv	(29)
		elements		2		98.77		0.14	[0.01	L			(31)
				effective wi	ndow U-va			g formula 1,	/ī(1/U-valu	ıe)+0.041 a	ns aiven in	paragraph	1 3.2	(01)
				nternal wal				,			- J	1		
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				31.3	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	6005.97	(34)
Therm	al mass	parame	ter (TM	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value:	Low		100	(35)
	-	sments wh ad of a de			construct	ion are not	t known pr	recisely the	indicative	e values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						9.68	(36)
			are not kr	own (36) =	= 0.05 x (3	1)			(00)	(2.2)				
	abric he			1						(36) =	0.5) (5)		40.98	(37)
ventila		r	r			l	11	Δ		$= 0.33 \times ($	1	i –	1	
(38)m=	Jan 11.29	Feb 11.16	Mar 11.03	Apr 10.35	May 10.22	Jun 9.54	Jul 9.54	Aug 9.41	Sep 9.81	Oct 10.22	Nov 10.49	Dec 10.76		(38)
				10.55	10.22	9.04	9.04	3.41				10.70]	(00)
		52.14	r	51.34	51.2	E0 E0	50.53	50.00		=(37) + (37)	· ·	E1 74	1	
(39)m=	52.28	52.14	52.01	51.54	51.2	50.53	50.55	50.39	50.8	51.2 Average =	51.47 Sum(39) ₁	51.74	51.3	(39)

Heat lo	oss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.02	1.02	1.02	1	1	0.99	0.99	0.98	0.99	1	1	1.01		
Numbe	er of dav	vs in mo	nth (Tab	le 1a)				•		Average =	Sum(40)1.	12 /12=	1	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								I						
4. Wa	ter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				: [1 - exp	(-0.0003	849 x (TF	- A -13.9)2)] + 0.(0013 x (⁻	TFA -13.		73		(42)
Annua <i>Reduce</i>	l averag	e hot wa al average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.15		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	87.06	83.9	80.73	77.56	74.4	71.23	71.23	74.4	77.56	80.73	83.9	87.06		
Enorm	contant of	hot water	upped op	loulotod m	onthly - 1	100 v Vd r). Tm / 2600			$m(44)_{112} =$		949.77	(44)
			·		-					-	ables 1b, 1			
(45)m=	129.11	112.92	116.52	101.59	97.48	84.12	77.95	89.44	90.51	105.48	115.14 m(45) ₁₁₂ =	125.04	1245.3	(45)
lf instan	taneous w	ater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		10tal = Su	III(43) ₁₁₂ =		1245.5	(43)
(46)m=	19.37	16.94	17.48	15.24	14.62	12.62	11.69	13.42	13.58	15.82	17.27	18.76		(46)
	storage		. in alu dir				-							
-		. ,					-	within sa	ame ves	sei		0		(47)
	•	•	and no ta hot wate		•			ombi boil	ers) ente	er '0' in (47)			
	storage			,					,	,				
a) If m	nanufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
			r storage					(48) x (49)) =		1.	10		(50)
,			eclared of factor fi	•							0	02		(51)
		-	see secti		- (.,,				0.	02		()
		from Ta									1.	03		(52)
Tempe	erature f	actor fro	m Table	2b							0	.6		(53)
•••			r storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
	. ,	(54) in (5	•	for oach	month			((56)m - (55) v (41)	m	1.	03		(55)
			culated	,			1	((56)m = (1				(50)
(56)m=	32.01	28.92 dedicate	d solar sto	30.98	32.01 m = (56)m	30.98 x [(50) – (32.01 H11)] ∸ (5	32.01	30.98 7)m = (56)	32.01 m where (30.98 H11) is fro	32.01 m Append	ix H	(56)
-				- · ·				r	· · ·		-			(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		
	-		nnual) fro			E0)		SE (44)	~			0		(58)
	-						. ,	65 × (41) ng and a		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)
			I	!	ļ	I	!	I	ļ	ļ	!			

Combi	loss ca	lculated	for eac	h month	(61)m =	(60)) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0		0	0	0	0	0	0	0]	(61)
Total h	neat req	uired for	water h	neating o	alculated	l fo	r eac	h month	(62)m	= 0.85 ×	(45)m +	- (46)m +	(57)m +	(59)m + (61)m	
(62)m=	184.39	162.85	171.8	155.08	152.75	1:	37.61	133.22	144.72	144.01	160.76	168.64	180.31		(62)
Solar DI	-IW input	calculated	using Ap	pendix G	or Appendix	с Н ((negati	ve quantity	/) (enter '	0' if no sola	r contribu	ution to wate	er heating)		
(add a	dditiona	al lines if	FGHR	S and/or	WWHRS	ap	plies	, 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	iter												
(64)m=	184.39	162.85	171.8	155.08	152.75	1:	37.61	133.22	144.72	144.01	160.76	168.64	180.31		
		•				-			Ou	tput from w	ater heat	er (annual)	112	1896.14	(64)
Heat g	ains fro	m water	heating	g, kWh/n	nonth 0.2	5 ´	[0.85	× (45)m	+ (61)	m] + 0.8 x	x [(46)n	n + (57)m	+ (59)m]	
(65)m=	87.15	77.49	82.97	76.57	76.63	7	0.76	70.14	73.96	72.89	79.29	81.08	85.8		(65)
inclu	de (57)	m in calo	culation	of (65)r	n only if c	ylir	nder i	s in the c	dwelling	, g or hot w	ater is	from com	munity h	neating	
5. In	ternal g	ains (see	e Table	5 and 5	a):										
	Ŭ	ns (Table			,										
motab	Jan	Feb	Mar		May		Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	86.3	86.3	86.3	86.3	86.3		36.3	86.3	86.3	86.3	86.3	86.3	86.3		(66)
Lightin	g gains	(calcula	ted in A		L, equat	ion	L9 o	r L9a), a	lso see	Table 5	1			1	
(67)m=	13.41	11.91	9.68	7.33	5.48	i —	4.63	5	6.5	8.72	11.08	12.93	13.78]	(67)
Applia	nces da	ins (calc	ulated i	n Apper	ndix L. ea	uat	tion L	13 or L1	i 3a), als	o see Ta	ble 5		<u> </u>	1	
(68)m=	150.39	151.95	148.02	<u> </u>	· · · · ·	r –	19.14	112.51	110.95		123.25	133.82	143.75]	(68)
										L see Table			<u> </u>]	
(69)m=	31.63	31.63	31.63	31.63	31.63	-	1.63	31.63	31.63	31.63	31.63	31.63	31.63	1	(69)
	L	I ns gains	l (Table	 52)							I			1	
(70)m=				0	0		0	0	0	0	0	0	0	1	(70)
					ues) (Tab			ů	Ů		Ů			J	
(71)m=		<u> </u>	-69.04	-	<u> </u>	r –	5) 59.04	-69.04	-69.04	-69.04	-69.04	-69.04	-69.04	1	(71)
					00.04		55.04	00.04	-00.04	00.04	00.04	-05.04	-03.04	J	()
(72)m=	117.14	gains (T	111.51		103		8.28	94.27	99.41	101.24	106.58	112.61	115.32	1	(72)
				100.55	103	9						71)m + (72		J	(12)
(73)m=	329.82	gains =	318.1	302.22	286.45	2	70.94	260.67	265.75		289.8	308.25	321.74	1	(73)
. ,	lar gain	1	510.1	302.22	200.45	2	70.94	200.07	205.75	273.73	209.0	308.25	321.74		(73)
			usina sol	ar flux fror	n Table 6a	and	assoc	iated equa	tions to a	convert to th	ne applica	able orienta	tion.		
		Access F	U	Are			Flu			g_		FF		Gains	
•		Table 6d		m²				ole 6a		Table 6b	-	Table 6c		(W)	
Southe	ast 0.9x	0.77	,	4	.58	x	3	6.79) x [0.63	_ × [0.7		51.49	(77)
	ast 0.9x	0.77			.58	x		2.67		0.63		0.7		87.71](77)
	ast 0.9x	0.77			.58	x		5.75		0.63		0.7		120](77)
	ast 0.9x	0.77			.50	x		06.25		0.63		0.7		148.69](**)](77)
	ast 0.9x	0.77			.50	x		19.01		0.63		0.7		166.54](** <i>)</i>](77)
	0.01	0.77		`	.50	^	1	19.01		0.05	^ ^ L	0.7		100.54	()

Southeast $0.9x$ 0.77 x 4.58 x 118.15 x 0.63 x 0.7 = 165.34 (Southeast $0.9x$ 0.77 x 4.58 x 113.91 x 0.63 x 0.7 = 159.4 (Southeast $0.9x$ 0.77 x 4.58 x 104.39 x 0.63 x 0.7 = 146.08 (Southeast $0.9x$ 0.77 x 4.58 x 92.85 x 0.63 x 0.7 = 129.94 (Southeast $0.9x$ 0.77 x 4.58 x 92.85 x 0.63 x 0.7 = 96.93 (Southeast $0.9x$ 0.77 x 4.58 x 69.27 x 0.63 x 0.7 = 96.93 (Southeast $0.9x$ 0.77 x 4.58 x 44.07 x 0.63 x 0.7 = 61.67 (Southeast $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 = 97.28 (Southwest $0.9x$ 0.77 x 8.65 x 62.67 0.63 x 0.7 = 165.7 (Southwest $0.9x$ 0.77 x 8.65 x 106.25 0.63 x 0.7 = 226.72 (Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 = 312.37 (Southwest 0.9											
Note of the set											
NoteNoteNoteSoutheast $0.9x$ 0.77 x 4.58 x 92.85 x 0.63 x 0.7 $=$ 129.94 $()$ Southeast $0.9x$ 0.77 x 4.58 x 69.27 x 0.63 x 0.7 $=$ 96.93 $()$ Southeast $0.9x$ 0.77 x 4.58 x 44.07 x 0.63 x 0.7 $=$ 61.67 $()$ Southeast $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 $=$ 61.67 $()$ Southeast $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 $=$ 61.67 $()$ Southwest $0.9x$ 0.77 x 8.65 x 36.79 0.63 x 0.7 $=$ 97.28 $()$ Southwest $0.9x$ 0.77 x 8.65 x 85.75 0.63 x 0.7 $=$ 226.72 $()$ Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 280.91 $()$ Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 314.65 $()$ Southwest $0.9x$ 0.77 x 8.65 x 113.9											
OutputSoutheast $0.9x$ 0.77 x 4.58 x 69.27 x 0.63 x 0.7 $=$ 96.93 $()$ Southeast $0.9x$ 0.77 x 4.58 x 44.07 x 0.63 x 0.7 $=$ 61.67 $()$ Southeast $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 $=$ 61.67 $()$ Southwest $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 $=$ 61.67 $()$ Southwest $0.9x$ 0.77 x 8.65 x 36.79 0.63 x 0.7 $=$ 97.28 $()$ Southwest $0.9x$ 0.77 x 8.65 x 62.67 0.63 x 0.7 $=$ 97.28 $()$ Southwest $0.9x$ 0.77 x 8.65 x 106.25 0.63 x 0.7 $=$ 226.72 $()$ Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 314.65 $()$ Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 314.65 $()$ Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$											
Southeast $0.9x$ Order of the colspan="6">Order											
Southeast $0.9x$ 0.77 x 4.58 x 31.49 x 0.63 x 0.7 $=$ 44.06 (Southwest $0.9x$ 0.77 x 8.65 x 36.79 0.63 x 0.7 $=$ 97.28 (Southwest $0.9x$ 0.77 x 8.65 x 62.67 0.63 x 0.7 $=$ 97.28 (Southwest $0.9x$ 0.77 x 8.65 x 62.67 0.63 x 0.7 $=$ 165.7 (Southwest $0.9x$ 0.77 x 8.65 x 85.75 0.63 x 0.7 $=$ 226.72 (Southwest $0.9x$ 0.77 x 8.65 x 106.25 0.63 x 0.7 $=$ 230.91 (Southwest $0.9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 314.65 (Southwest $0.9x$ 0.77 x 8.65 x 113.91 0.63 x 0.7 $=$ 301.16 (Southwest $0.9x$ 0.77 x 8.65 x 104.39 0.63 x 0.7 $=$ 275.99 (
Southwest 0.11 1.30 1.30 0.110 0.63 1.10 0.11 1.100 1.100 Southwest $9x$ 0.77 x 8.65 x 36.79 0.63 x 0.7 $=$ 97.28 (1.100) Southwest $9x$ 0.77 x 8.65 x 62.67 0.63 x 0.7 $=$ 165.7 (1.100) Southwest $9x$ 0.77 x 8.65 x 85.75 0.63 x 0.7 $=$ 226.72 (1.100) Southwest $9x$ 0.77 x 8.65 x 106.25 0.63 x 0.7 $=$ 280.91 (1.100) Southwest $9x$ 0.77 x 8.65 x 119.01 0.63 x 0.7 $=$ 314.65 (1.100) Southwest $9x$ 0.77 x 8.65 x 113.91 0.63 x 0.7 $=$ 301.16 (1.100) Southwest $9x$ 0.77 x 8.65 x 104.39 0.63 x 0.7 $=$ 275.99 (1.100)											
Southwest 0.77 \times 8.65 \times 62.67 0.63 \times 0.7 $=$ 165.7 $($ Southwest $9x$ 0.77 \times 8.65 \times 85.75 0.63 \times 0.7 $=$ 226.72 $($ Southwest $9x$ 0.77 \times 8.65 \times 106.25 0.63 \times 0.7 $=$ 226.72 $($ Southwest $9x$ 0.77 \times 8.65 \times 106.25 0.63 \times 0.7 $=$ 280.91 $($ Southwest $9x$ 0.77 \times 8.65 \times 119.01 0.63 \times 0.7 $=$ 314.65 $($ Southwest $9x$ 0.77 \times 8.65 \times 118.15 0.63 \times 0.7 $=$ 312.37 $($ Southwest $9x$ 0.77 \times 8.65 \times 113.91 0.63 \times 0.7 $=$ 301.16 $($ Southwest $9x$ 0.77 \times 8.65 \times 104.39 0.63 \times 0.7 $=$ 275.99 $($											
OutputOutputSouthwest0.9x 0.77 x 8.65 x 85.75 0.63 x 0.7 = 226.72 ()Southwest0.9x 0.77 x 8.65 x 106.25 0.63 x 0.7 = 280.91 ()Southwest0.9x 0.77 x 8.65 x 119.01 0.63 x 0.7 = 314.65 ()Southwest0.9x 0.77 x 8.65 x 119.01 0.63 x 0.7 = 312.37 ()Southwest0.9x 0.77 x 8.65 x 113.91 0.63 x 0.7 = 301.16 ()Southwest0.9x 0.77 x 8.65 x 104.39 0.63 x 0.7 = 275.99 ()											
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Southwest0.9x 0.77 x 8.65 x 119.01 0.63 x 0.7 = 314.65 (Southwest0.9x 0.77 x 8.65 x 118.15 0.63 x 0.7 = 312.37 (Southwest0.9x 0.77 x 8.65 x 113.91 0.63 x 0.7 = 312.37 (Southwest0.9x 0.77 x 8.65 x 113.91 0.63 x 0.7 = 301.16 (Southwest0.9x 0.77 x 8.65 x 104.39 0.63 x 0.7 = 275.99 (
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Southwest0.9x 0.77 x 8.65 x 104.39 0.63 x 0.7 = 275.99 ()											
Southwest _{0.9x} 0.77 x 8.65 x 92.85 0.63 x 0.7 = 245.49 (
Southwest _{0.9x} 0.77 x 8.65 x 69.27 0.63 x 0.7 = 183.13 (
Southwest _{0.9x} 0.77 x 8.65 x 44.07 0.63 x 0.7 = 116.52 (
Southwest _{0.9x} 0.77 x 8.65 x 31.49 0.63 x 0.7 = 83.25 (
Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$											
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m											
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m= 148.77 253.41 346.72 429.6 481.19 477.71 460.56 422.08 375.42 280.07 178.19 127.31											
(83)m= 148.77 253.41 346.72 429.6 481.19 477.71 460.56 422.08 375.42 280.07 178.19 127.31											
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$											
(83)m= 148.77 253.41 346.72 429.6 481.19 477.71 460.56 422.08 375.42 280.07 178.19 127.31 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 478.59 581.46 664.82 731.82 767.64 748.65 721.23 687.82 649.15 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) 569.86 486.44 449.05 (49.15) (49.15) (49.15) (49.15) (49.15) </td											
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(83)m= 148.77 253.41 346.72 429.6 481.19 477.71 460.56 422.08 375.42 280.07 178.19 127.31 (i) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 478.59 581.46 664.82 731.82 767.64 748.65 721.23 687.82 649.15 569.86 486.44 449.05 (i) Comportation of the set of the se											
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$											
$ \begin{array}{c} (83)m= & 148.77 & 253.41 & 346.72 & 429.6 & 481.19 & 477.71 & 460.56 & 422.08 & 375.42 & 280.07 & 178.19 & 127.31 \\ \hline Total gains - internal and solar (84)m = (73)m + (83)m , watts \\ (84)m= & 478.59 & 581.46 & 664.82 & 731.82 & 767.64 & 748.65 & 721.23 & 687.82 & 649.15 & 569.86 & 486.44 & 449.05 \\ \hline \hline \textbf{A} \ \textbf{A} \ \textbf{C} \ \textbf{A} \ \textbf{A} \ \textbf{B} \ \textbf{B} \ \textbf{C} \ \textbf{C} \ \textbf{A} $											
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$											
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$											

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

_							·	i						
. ,	18.6	19.03	19.51	19.98	20.28	20.44	20.49	20.48	20.39	19.99	19.24	18.52		(93)
8. Space								Table O		· T ' · · · · /	70)		1-1-	
Set Ti to the utilis				•		ied at ste	epitor	Table 9	o, so tha	t 11,m=(76)m an	d re-caic	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisatio	on fact	or for g	ains, hm	:										
(94)m= (0.87	0.82	0.74	0.64	0.52	0.38	0.27	0.29	0.46	0.67	0.82	0.89		(94)
Useful g	jains, l	nmGm ,	W = (94	4)m x (84	4)m						-			
(95)m= 4 ⁻	18.55	475.79	495.28	469.28	396.16	282.54	192.9	201.18	296.79	384.56	400.86	398.85		(95)
Monthly		-				i		1						
	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 los						ì		1 /	. ,	-	004.00	740 74		(07)
	747.6	736.81	676.74	568.94	439.51	295.17	196.3	205.67	319.52	481	624.82	740.71		(97)
Space h (98)m= 24	44.81	175.41	135	71.76	32.25	0	11 = 0.02	24 X [(97]	0	71.75 (4	161.26	254.34		
(00)112	11.01	170.41	100	71.70	02.20	Ŭ	Ů				⁻) = Sum(9		1146.57	(98)
Crease	o o timo				lucor.			Tota		(RWN)yea) = Oum(0	0)15,912 -		4
Space h		•											22.39	(99)
9b. Energ														
This part Fraction (-		• •	•		unity sch	neme.	0	(301)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system $1 - (301) =$														
					-								1	(302)
The commu includes bo	-									up to four	other heat	sources; th	he latter	
Fraction			-			ioni ponoi	oluliono.	0007.pp0					1	(303a)
Fraction of	of tota	l space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for	r contr	ol and o	charging	method	(Table 4	4c(3)) fo	r comm	unity hea	ting sys	tem		ĺ	1	(305)
Distributio						. ,,		-				[1.05	(306)
Space he	eating											L	kWh/yea	 r
Annual sp	-		requirem	nent								[1146.57	7
Space he	eat froi	m Comr	nunity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [1203.9	(307a)
Efficiency	of se	condary	/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space he	eating	require	ment froi	n secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water be	oting											•		
Water he Annual w	-	eating r	equirem	ent								[1896.14	
If DHW fr Water he									(64) x (30	03a) x (30	5) x (306) =	- [1990.95	(310a)
Electricity								0.01			· (310a)…(l	31.95	(313)
Cooling S	System	n Energ	y Efficiei	ncy Rati	C							[0	(314)
Space co	oling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	(314) =		[0	(315)
Electricity	for p	umps ai	nd fans v	within dv	velling (1	Table 4f)	:					L		
mechanic								outside				[177.68	(330a)

warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =		177.68	(331)
Energy for lighting (calculated in Appendix L)		236.78	(332)		
Electricity generated by PVs (Appendix M) (ne	gative quantity)			-518.71	(333)
Electricity generated by wind turbine (Appendi	x M) (negative quantity)			0	(334)
12b. CO2 Emissions – Community heating sch	neme				
	Energy kWh/year	Emission fac kg CO2/kWh		nissions g CO2/year	
CO2 from other sources of space and water he Efficiency of heat source 1 (%)	eating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the secon	d fuel	94	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	734.13	(367)
Electrical energy for heat distribution	[(313) x	0.52	=	16.58	(372)
Total CO2 associated with community systems	S (363)(366) + (368)(372))	=	750.72	(373)
CO2 associated with space heating (secondar	y) (309) x	0	=	0	(374)

(332))) x

Total CO2 associated with space and water heating (373) + (374) + (375) =

CO2 associated with electricity for pumps and fans within dwelling $\ \ \textbf{(331))}\ x$

CO2 associated with electricity for lighting

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

Total CO2, kg/yearsum of (376)...(382) =Dwelling CO2 Emission Rate $(383) \div (4) =$ El rating (section 14)

=	122.89	(379)
1 =	-269.21	(380)
	000.04	(202)
	696.61	(383)
	13.6	(384)
	90.3	(385)
		J

750.72

92.22

=

0.52

0.52

0.52

x 0.0

(376)

(378)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 October 2020

Property Details: Plot 16

Dwelling type: Located in: Region: Cross ventilation pos Number of storeys: Front of dwelling face Overshading: Overhangs: Thermal mass param Night ventilation: Blinds, curtains, shur Ventilation rate durin Overheating Details:	es: eter: tters: g hot we neat loss	coeffic		None Indicative False 6 (Winde 253.51	2			(P1)
Summer heat loss co				41 294.5				(P2)
Overhangs:								
Orientation: South West (SW) South East (SE)	Ratio: 0 0		Z_overhangs: 1 1					
Solar shading:								
Orientation: South West (SW) South East (SE)	Z blind 1 1	ls:	Solar access: 0.9 0.9	Ov 1 1	erhangs:	Z summer: 0.9 0.9		(P8) (P8)
Solar gains:								
Orientation South West (SW) South East (SE)	0.9 x 0.9 x	Area 8.65 4.58	Flux 119.92 119.92	g_ 0.63 0.63	FF 0.7 0.7	Shading 0.9 0.9 Total	Gains 370.59 196.15 566.74	(P3/P4)
Internal gains:								
Internal gains Total summer gains Summer gain/loss ratio Mean summer externa Thermal mass tempera Threshold temperature Likelihood of high inter	l tempera ature incre	ement		3 9 3 1 1 2	lune 69.28 64.22 6.27 6 .3 0.57 Slight	July 356.29 923.03 3.13 17.9 1.3 22.33 Medium	August 362.85 891.55 3.03 17.8 1.3 22.13 Medium	(P5) (P6) (P7)
Assessment of likelih	Assessment of likelihood of high internal temperatur							

			User D	etails:							
Assessor Name: Software Name:	Zahid Ashraf Stroma FSAP 20	112		Stroma Softwa					001082 n: 1.0.5.9		
Software Name.	Stioma 1 SAI 20			Address:		51011.		V EI 310	1. 1.0.3.3		
Address :			operty /	nuurcoo.							
1. Overall dwelling dime	nsions:										
			Area	ı(m²)		Av. He	ight(m)		Volume(m ³)		
Ground floor			5	1.22	(1a) x	2	2.5	(2a) =	128.04	(3a)	
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	le)+(1n)) 5 ⁻	1.22	(4)						
Dwelling volume					(3a)+(3b)	+(3c)+(3c	l)+(3e)+	.(3n) =	128.04	(5)	
2. Ventilation rate:											
	main heating	secondary heating	/	other		total			m ³ per hour		
Number of chimneys	0 +	0] + [0] = [0	x 4	40 =	0	(6a)	
Number of open flues	0 +	0] + [0] = [0	x2	20 =	0	(6b)	
Number of intermittent far	าร				Γ	2	x ′	10 =	20	(7a)	
Number of passive vents						0	x ^	10 =	0	(7b)	
Number of flueless gas fir	es				Γ	0	x 4	40 =	0	(7c)	
Air changes per hour											
Infiltration due to chimney	s flues and fans –	(6a)+(6b)+(7a	a)+(7b)+(7	7c) =	Г			÷ (5) =		(8)	
If a pressurisation test has be					ontinue fro	20 om (9) to (÷ (3) =	0.16		
Number of storeys in th		.,							0	(9)	
Additional infiltration							[(9)-	-1]x0.1 =	0	(10)	
Structural infiltration: 0.	25 for steel or timbe	r frame or	0.35 for	masonr	y constr	uction			0	(11)	
if both types of wall are pro deducting areas of openin		esponding to	the greate	er wall area	a (after						
If suspended wooden fl	• / ·	aled) or 0.	1 (seale	d), else	enter 0				0	(12)	
If no draught lobby, ent		,	,	,,					0	(13)	
Percentage of windows	and doors draught	stripped							0	(14)	
Window infiltration			(0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)	
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)	
Air permeability value,	q50, expressed in cu	ubic metres	s per ho	ur per so	quare m	etre of e	nvelope	area	3	(17)	
If based on air permeabili	•								0.31	(18)	
Air permeability value applies		as been done	e or a deg	ree air pei	meability	is being u	sed				
Number of sides sheltered Shelter factor				(20) = 1 - [0.075 x (1	9)] =			2 0.85	(19) (20)	
Infiltration rate incorporati	ng shelter factor			(21) = (18)		/-			0.85	(20)	
Infiltration rate modified for	-	he		(0.20		
r	Mar Apr May		Jul	Aug	Sep	Oct	Nov	Dec			
Monthly average wind spe			I	0			1				
· · · · · · · · ·	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7			
	I	_11					1	1	I		
Wind Factor (22a)m = (22 (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			
· · · · · ·			I				•		1		

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	: (21a) x	(22a)m				_	
	0.33	0.33	0.32	0.29	0.28	0.25	0.25	0.24	0.26	0.28	0.29	0.31		
	<i>ate effec</i> echanica		change i	rate for t	he appli	cable ca	se							
				andix N (2	3h) - (23a	a) v Emv (e	auation (I	N5)) , othe	rwise (23h) - (23a)			0	(23a)
			0 11		, ,	, ,	•	n Table 4h	``) = (20u)			0	(23b)
			-	-	-					2b)m i (22h) v [1 (22a)	0	(23c)
a) II (24a)m=								HR) (24a	0 $11 = (2)$	$\frac{20}{10} + \frac{10}{10}$		1 - (230)]]	(24a)
		÷	-	÷	-	-	Ť	I 0 MV) (24b			÷	0	J	(210)
(24b)m=								0	0 = (22)	$\frac{20}{10} + \frac{10}{10}$	230)	0	1	(24b)
		-	-	-	-	-	Ţ	Ţ	•	0	0	0	J	(240)
,					•	•		on from c c) = (22b		.5 × (23b))			
(24c)m=	= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
,					•			on from l 0.5 + [(2		0.51	1		1	
(24d)m=	<u> </u>	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55]	(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t) or (24	c) or (24	ld) in boy	(25)	1	1	ļ	1	
(25)m=	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55]	(25)
0.11							1	1		1	1	•	1	
			eat loss p			Not An		11					_	
ELEN	IENT	Gros area		Openin rr		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-valu∉ kJ/m²₊l		A X k kJ/K
Doors						2	x	1.4	=	2.8				(26)
Windo	ws Type	e 1				8.651	x1	/[1/(1.4)+	0.04] =	11.47				(27)
Windo	ws Type	2				4.579) x1	/[1/(1.4)+	0.04] =	6.07				(27)
Floor	Гуре 1					2.292	<u>2 x</u>	0.12	=	0.27504	4			(28)
Floor 7	Гуре 2					48.92	3 X	0.12	=	5.87076	3		\neg	(28)
Walls [·]	Type1	41.9	94	13.2	3	28.71	x	0.15		4.31	i F		\exists	(29)
Walls	Type2	5.6	2	2		3.62	×	0.14		0.51	i F		\exists	(29)
Total a	area of e	lements	, m²			98.77	7							(31)
			ows, use e sides of ir				ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	n 3.2	
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				31.3	(33)
Heat c	apacity	Cm = S((A x k)						((28).	(30) + (32	2) + (32a)	(32e) =	6005.97	(34)
Therm	al mass	parame	eter (TMF		- TFA) ir	n kJ/m²K			Indica	tive Value	: Low		100	(35)
	-		ere the de tailed calci		construct	ion are not	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						9.68	(36)
			are not kn	own (36) =	= 0.05 x (3	1)								
	abric he								(33) +	(36) =			40.98	(37)
Ventila		1	alculated				-	-	. ,	= 0.33 × (1	
(25)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	23.45	23.36	23.27	22.86	22.78	22.42	22.42	22.35	22.56	22.78	22.94	23.1	J	(38)
	ransfer o		r							= (37) + (3	· ·		1	
(39)m=	64.44	64.35	64.26	63.84	63.76	63.4	63.4	63.33	63.54	63.76	63.92	64.09	00.01	(20)
										Average =	Sum(39)1	12 / 1 Z=	63.84	(39)

Heat lo	oss para	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.26	1.26	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.25	1.25	1.25		
Numbe	er of day	/s in mo	nth (Tab	le 1a)	•		•	•	,	Average =	Sum(40)1.	12 /12=	1.25	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
I														
4. Wa	iter hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF	A > 13.	upancy, 9, N = 1 9, N = 1		: [1 - exp	(-0.0003	849 x (TF	FA -13.9	9)2)] + 0.0	0013 x (⁻	TFA -13		73		(42)
Reduce	the annua	al average	hot water	usage by		welling is	designed	(25 x N) to achieve		se target o		.15		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pe	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	87.06	83.9	80.73	77.56	74.4	71.23	71.23	74.4	77.56	80.73	83.9	87.06		
Enorm	contant at	bot wator	upped op	loulotod m	onthly - 1	100 v Vd r		Tm / 2600			$m(44)_{112} =$		949.77	(44)
			·					DTm / 3600		-				
(45)m=	129.11	112.92	116.52	101.59	97.48	84.12	77.95	89.44	90.51	105.48	115.14 m(45) ₁₁₂ =	125.04	1245.3	(45)
lf instant	taneous v	vater heati	ng at point	t of use (no	o hot wate	r storage),	enter 0 in	boxes (46		10tal = 3u	III(4J)112 =		1245.5	(40)
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage										·			
-				• •			-	within sa	ame ves	sel		0		(47)
	•	-			velling, e ocludes i			n (47) ombi boil	ers) ente	r '0' in <i>(</i>	(47)			
	storage		not wat			notantai								
a) If m	anufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):				(0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
0,			•	, kWh/ye			_	(48) x (49)) =			0		(50)
				•	loss fact le 2 (kW							0	l	(51)
		-	see secti			1/1110/00	xy)					0		(31)
	•	from Ta										0		(52)
Tempe	erature f	actor fro	m Table	2b								0		(53)
			-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	(54) in (ধ	•									0		(55)
1	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contain	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	50), else (5	7)m = (56)	m where (H11) is fro	m Append	IX H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
	•	•	,	om Table								0		(58)
								65 × (41)			-1-1			
(moo (59)m=	dified by	o factor f	rom Tab		here is s	olar wat	ter heati	ng and a	cylinde	r thermo	ostat)	0	l	(59)
(59)11=	U						0		0		0	0		(00)

Combi	loss ca	lculated	for ea	hch	month ((61)m =	(60)) ÷ 36	65 × (41)	m						
(61)m=	0	0	0		0	0		0	0	0	0	0	0	0		(61)
Total h	eat req	uired for	water	r he	ating ca	alculated	l fo	r eacl	h month	(62)m	= 0.85 ×	(45)m -	- (46)m +	(57)m +	· (59)m + (61)m	
(62)m=	109.74	95.98	99.0	5	86.35	82.86		71.5	66.25	76.03	76.93	89.66	97.87	106.28]	(62)
Solar DH	-IW input	calculated	using A	Appe	endix G or	Appendix	с Н ((negativ	ve quantity) (enter	'0' if no sola	ar contrib	ution to wate	er heating	-)	
(add a	dditiona	al lines if	FGHF	RS a	and/or V	VWHRS	i ap	plies,	, see Ap	pendix	G)					
(63)m=	0	0	0		0	0		0	0	0	0	0	0	0		(63)
Output	from w	ater hea	ter													
(64)m=	109.74	95.98	99.0	5	86.35	82.86		71.5	66.25	76.03	76.93	89.66	97.87	106.28]	
										Οι	itput from w	ater heat	er (annual)	112	1058.51	(64)
Heat g	ains fro	m water	heatii	ng,	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61)	m] + 0.8 :	x [(46)n	n + (57)m	+ (59)m	n]	
(65)m=	27.44	24	24.7	6	21.59	20.71	1	7.87	16.56	19.01	19.23	22.42	24.47	26.57]	(65)
inclu	de (57)	m in calo	ulatic	n o	f (65)m	only if c	ylir	nder is	s in the c	wellin	g or hot w	vater is	from com	imunity l	neating	
5. Int	ernal d	ains (see	e Tabl	e 5	and 5a):	•				-			•	-	
		ns (Table														
metab	Jan	Feb	, <u>5), v</u> Ma		Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(66)m=	86.3	86.3	86.3	-	86.3	86.3	-	36.3	86.3	86.3	86.3	86.3	86.3	86.3	4	(66)
	n dains	(calcula									Table 5	1			1	
(67)m=	13.41	11.91	9.68	<u> </u>	7.33	5.48		4.63	5	6.5	8.72	11.08	12.93	13.78	1	(67)
											so see Ta]	
(68)m=	150.39	151.95	148.0	— —	139.64	129.08	r –	19.14	112.51	110.95		123.25	133.82	143.75	1	(68)
													155.62	143.73]	(00)
	<u> </u>	<u>`</u>		<u> </u>	31.63	· ·	-				see Table		21.62	24.62	1	(69)
(69)m=	31.63	31.63	31.6			31.63	3	31.63	31.63	31.63	31.63	31.63	31.63	31.63]	(09)
-		ns gains	r i	e 5	-		—		-		1 -	1			1	(70)
(70)m=	0	0	0		0	0		0	0	0	0	0	0	0	J	(70)
		vaporatic	· ·	-			r –					-			1	
(71)m=	-69.04	-69.04	-69.0)4	-69.04	-69.04	-6	69.04	-69.04	-69.04	-69.04	-69.04	-69.04	-69.04		(71)
Water	heating	gains (T	able	5)			-								-	
(72)m=	36.88	35.71	33.2	8	29.98	27.84	2	4.83	22.26	25.55	26.71	30.13	33.98	35.71		(72)
Total i	nterna	l gains =						(66)	m + (67)m	+ (68)n	ı + (69)m +	(70)m +	(71)m + (72))m	-	
(73)m=	249.56	248.45	239.8	37	225.85	211.29	19	97.49	188.66	191.88	199.21	213.34	229.62	242.13		(73)
6. So	lar gain	s:														
-			•		flux from	Table 6a	and			tions to	convert to th	ne applic	able orienta	tion.		
Orienta		Access F Table 6d			Area m ²			Flu	x ole 6a		g_ Table 6b		FF Table 6c		Gains	
															(W)	-
Southe		0.77		x	4.5	58	x	3	6.79	x	0.63	×	0.7	=	51.49	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	4.5	58	x	6	2.67	x	0.63	×	0.7	=	87.71	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	4.5	58	x	8	5.75	x	0.63	x	0.7	=	120	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	4.5	58	x	10	06.25	x	0.63	x	0.7	=	148.69	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	4.5	58	x	11	19.01	x	0.63	x	0.7	=	166.54	(77)

	Southeast $0.9x$ 0.77 x 4.58 x 118.15 x 0.63 x 0.7 = 165.34 (77)														
Southea	ast <mark>0.9x</mark>	0.77	x	4.	58	x	1	18.15	x	0.63	x	0.7	=	165.34	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.5	58	x	1	13.91	x	0.63	x	0.7	=	159.4	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.	58	x	1	04.39	x	0.63	x	0.7	=	146.08	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.5	58	x	9	92.85	x	0.63	x	0.7	=	129.94	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.	58	x	6	69.27	x	0.63	x	0.7	=	96.93	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.5	58	x	4	14.07	x	0.63	x	0.7	=	61.67	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	4.5	58	x	3	31.49	x	0.63	x	0.7	=	44.06	(77)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	3	36.79]	0.63	x	0.7	=	97.28	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	6	62.67		0.63	x	0.7	=	165.7	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	6	35.75		0.63	x	0.7	=	226.72	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	1	06.25	1	0.63	x	0.7	=	280.91	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	1	19.01	1	0.63	x	0.7	=	314.65	(79)
Southwe	est <mark>o.9x</mark>	0.77	x	8.6	65	x	1	18.15	1	0.63	x	0.7	=	312.37	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	1	13.91	1	0.63	x	0.7	=	301.16	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	1	04.39	1	0.63	x	0.7	=	275.99	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	9	92.85	1	0.63	x	0.7	=	245.49	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	6	69.27	1	0.63	x	0.7	=	183.13	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	4	14.07	1	0.63	x	0.7	=	116.52	(79)
Southwe	est <mark>0.9x</mark>	0.77	x	8.6	65	x	3	31.49	1	0.63	x	0.7	=	83.25	(79)
	_								•						
Solar g	ains in v	watts, ca	alculated	d for eac	h mont	h			(83)m	= Sum(74)m .	(82)m				
(83)m=	148.77	253.41	346.72	429.6	481.19		77.71	460.56	422	.08 375.42	280.07	7 178.19	127.31]	(83)
Total g	ains – ir	nternal a	nd sola	r (84)m =	= (73)m) + (83)m	, watts	•	•				-	
(84)m=	398.33	501.86	586.59	655.45	692.48	6	675.2	649.22	613	.96 574.63	493.4	407.81	369.45		(84)
7. Mea	an inter	nal temp	erature	(heating	seaso	n)									
Temp	erature	during h	eating p	periods i	n the liv	ving	area	from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisa	tion fac	tor for g	ains for	living are	ea, h1,r	ກ (s	ee Ta	ble 9a)							
[Jan	Feb	Mar	Apr	May	/	Jun	Jul	A	ug Sep	Oct	Nov	Dec]	
(86)m=	0.94	0.91	0.85	0.77	0.66		0.52	0.4	0.4	3 0.61	0.81	0.92	0.95		(86)
Mean	interna	temper	ature in	living ar	ea T1 (follo	ow ste	ns 3 to 7	r 7 in T	able 9c)				-	
(87)m=	18.65	19.05	19.55	20.09	20.53	_	20.82	20.93	20.	<u></u>	20.11	19.26	18.56]	(87)
Temn	oraturo	durina b		L Deriode in	n rest o	f du	Alling	I from Ta	hla (), Th2 (°C)	I			1	
(88)m=	19.87	19.88	19.88	19.88	19.88	_	19.89	19.89	19.	1	19.88	19.88	19.88	1	(88)
]	. ,
Utilisa (89)m=	0.94	tor for ga	ains for 0.83	rest of d	weiling	1	,m (se 0.45	0.31	9a) 0.3	4 0.54	0.77	0.9	0.95	1	(89)
												0.9	0.95]	(00)
r		· · ·		1	i			1	r –	to 7 in Tabl	<u> </u>	1		1	(00)
(90)m=	17.75	18.14	18.63	19.15	19.54		19.78	19.86	19.		19.18		17.67		(90)
										I	LA = LI	ring area ÷ (4	+) =	0.45	(91)
Mean	internel	tompor	oturo (fr	or the we		مالاتم	(a) - f		. /4						
		· ·	· ·	1	1	_	•	1	+ (1	– fLA) × T2				-	
(92)m=	18.15	18.55	19.04	19.57	19.99		20.24	20.34	20.	- 1	19.59		18.07]	(92)

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

(93)m=	18.15	18.55	19.04	19.57	19.99	20.24	20.34	20.33	20.15	19.59	18.77	18.07		(93)
8. Spa	ace hea	ting requ	uirement	t										
				mperatui using Ta		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	n:										
(94)m=	0.92	0.87	0.81	0.73	0.61	0.47	0.35	0.38	0.56	0.76	0.88	0.93		(94)
Usefu	l gains,	hmGm ,	W = (9	4)m x (84	4)m									
(95)m=	366.38	438.98	477.8	476.35	423.72	319.19	224.62	232.6	322.58	377.3	360.81	343.76		(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	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	892.7	878.15	805.76	681.28	528.33	357.89	237.19	248.79	384.58	573.53	745.88	888.76		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97])m – (95)m] x (4 ⁻	1)m			
(98)m=	391.58	295.12	244	147.55	77.84	0	0	0	0	146	277.25	405.48		
								Tota	l per year	(kWh/year	⁻) = Sum(9	8)15,912 =	1984.82	(98)
Space	e heatin	g require	ement in	kWh/m²	/year								38.75	(99)
8c Sr		oling req	ujiremer	ht.									L	
				August.	See Tal	ole 10b								
Culou	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I				using 2										
(100)m=	0	0	0	0	0	595.97	469.17	481.34	0	0	0	0		(100)
Utilisa	tion fac	tor for lo	ss hm	•		1	1							
(101)m=	0	0	0	0	0	0.83	0.88	0.86	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) =	(100)m x	(101)m									
(102)m=	0	0	0	0	0	493.49	411.43	413.96	0	0	0	0		(102)
Gains	(solar o	gains ca	culated	for appli	cable we	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	854.18	822.61	782.32	0	0	0	0		(103)
				r month, < 3 × (98		lwelling,	continue	ous (kW	(h) = 0.0	24 x [(1(03)m – (102)m]:	x (41)m	
(104)m=	0	0	0	0	0	259.7	305.92	274.06	0	0	0	0		
						1	1	1	Total	= Sum(104)	=	839.68	(104)
Cooled	I fractior	า									area ÷ (4	4) =	1	(105)
Intermi	ttency f	actor (Ta	able 10b)	_	-	-							
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
									Total	' = Sum((104)	=	0	(106)
Space	cooling	requirer	nent for	month =	(104)m	× (105)	× (106)r	n						_
(107)m=	0	0	0	0	0	64.92	76.48	68.52	0	0	0	0		_
									Total	= Sum(107)	=	209.92	(107)
Space	cooling	requirer	nent in l	wh/m²/y	/ear				(107)	÷ (4) =			4.1	(108)
8f. Fab	ric Enei	rgy Effici	ency (ca	alculated	l only un	der spec	cial cond	litions, s	ee sectio	on 11)				-
Fabric	: Energy	y Efficier	псу						(99) -	+ (108) =	=		42.85	(109)

SAP Input

Property Details: Pl	ot 16							
Address: Located in: Region: UPRN: Date of assessm Date of certificat Assessment type Transaction type Tenure type: Related party dis Thermal Mass Pa Water use <= 12 PCDF Version:	te: e: e: sclosure: arameter:	New dw New dw Unknov No rela Indicati	s valley 2020 ober 2020 velling design stag velling	ge				
Property description	n:							
Dwelling type: Detachment:		Flat						
Year Completed:		2020						
Floor Location:		Floor	area:	c	torov boight			
Floor 0		51.215	m²	3	Storey height 2.5 m			
Living area:			m ² (fraction 0.4	49)				
Front of dwelling factors of the opening types:	aces:	North V	Vest					
Name:	Source:	T۱	/pe:	Glazing:		Argon:	Fram	ne:
NW	Manufacturer	So	lid	C		Yes		
SW SE	Manufacturer Manufacturer		Windowsdouble-glazedWindowsdouble-glazed					
Name:	Gap:		Frame Facto	or: g-value:	U-value:	Area:	No. c	of Openings:
NW SW	mm 16mm o	moro	0 0.7	2 8.651	1 1			
SE	16mm o		0.7	0.63 0.63	1.4 1.4	4.579	1	
Name:	Type-Name	e: Lo	ocation:	Orient:		Width:	Heig	ht:
NW SW			rridor Wall ternal Wall	North West South West		0 0	0 0	
SE			ternal Wall	South East		0	0	
Overshading:		Average	e or unknown					
Opaque Elements:		5						
Type: <u>External Elements</u>	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain	wall:	Карра:
External Wall	41.936	13.23	28.71	0.15	0	False		N/A
Corridor Wall Exposed Floor	5.618 2.292	2	3.62	0.15 0.12	0.4	False		N/A N/A
Ground Floor Internal Elements	48.923			0.12				N/A
Party Elements								
Thermal bridges:								
Thermal bridges:		User-de	fined (individual	PSI-values) Y-Valu	e = 0.098			
ar zriagos.		Lengtl	h Psi-valu	le		other stack lints	lc)	
		4.795	0.289	E2 Other	lintels (including	uther steel linte	15)	

SAP Input

	13.2	0.047	E4	Jamb
	17.452	0.069	E7	Party floor between dwellings (in blocks of flats)
[Approved]	2.725	0.06	E18	Party wall between dwellings
	8.175	0.106	E25	Staggered party wall between dwellings
[Approved]	5.45	0.09	E16	Corner (normal)
[Approved]	2.725	-0.09	E17	Corner (inverted internal area greater than external area)
	2.43	0.271	E20	Exposed floor (normal)
[Approved]	15.022	0.16	E5	Ground floor (normal)
	13.328	0	P3	Intermediate floor between dwellings (in blocks of flats)
	4.536	0.16	P7	Exposed floor (normal)
	8.792	0.16	P1	Ground floor

Ventilation:	
Pressure test: Ventilation: Number of chimneys: Number of open flues: Number of fans: Number of passive stacks: Number of sides sheltered: Pressure test:	Yes (As designed) Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True 0 0 0 2 3
Main heating system:	
Main heating system:	Community heating schemes Heat source: Community boilers heat from boilers – mains gas, heat fraction 1, efficiency 94 Piping>=1991, pre-insulated, low temp, variable flow Central heating pump : 2013 or later Design flow temperature: Unknown Boiler interlock: Yes
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 Water code: 901 Fuel :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:	Standard Tariff Unknown No conservatory 100% Low rise urban / suburban English No <u>Photovoltaic 1</u> Installed Peak power: 0.63 Tilt of collector: 30°

SAP Input

Overshading: None or very little Collector Orientation: South West No

Assess Zero Carbon Home:

User Details: ssessor Name: Zahid Ashraf Stroma Number: STRO001082														
	001082 n: 1.0.5.9													
Property Address: Plot 16														
Address :														
1. Overall dwelling dimensions:														
Area(m²) Av. Height(m) Ground floor 51.22 (1a) x 2.5 (2a) =	Volume(m ³) 128.04 (3a)													
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 51.22 (4)														
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = $	128.04 (5)													
2. Ventilation rate:														
main secondary other total heating heating	m ³ per hour													
Number of chimneys $0 + 0 + 0 = 0 \times 40 = 0$	0 (6a)													
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$	0 (6b)													
Number of intermittent fans 2 x 10 =	20 (7a)													
Number of passive vents 0 × 10 =	0 (7b)													
Number of flueless gas fires	0 (7c)													
Number of flueless gas fires 0 x 40 = Air changes														
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) = 20$ If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)	0.16 (8)													
Number of storeys in the dwelling (ns)	0 (9)													
Additional infiltration [(9)-1]x0.1 =	0 (10)													
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>if both types of wall are present, use the value corresponding to the greater wall area (after</i>	0 (11)													
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	0 (12)													
Percentage of windows and doors draught stripped	0 (13)													
Window infiltration $0.25 - [0.2 \times (14) \div 100] =$	0 (14)													
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	5 (17)													
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.41 (18)													
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used														
Number of sides sheltered	2 (19)													
Shelter factor (20) = 1 - [0.075 x (19)] =	0.85 (20)													
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	0.35 (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 3.8 3.7 4 4.3 4.5 4.7														
Wind Factor (22a)m = (22)m \div 4														
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18														

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	speed) =	(21a) x	(22a)m					
.	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41		
	ate effec echanica		-	rate for t	he appli	cable ca	se					1	0	(23a)
				endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)		l ſ	0	(23b)
						or in-use f				, , ,		l	0	(23c)
a) If	balance	d mech	anical ve	entilation	with he	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [⁻	ו (23c) – 1	-	
, (24a)m=		0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	d mech	anical ve	ntilation	without	heat rec	covery (N	ν MV) (24t)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	ntilation o	or positiv	/e input v	ventilatio	on from a	outside					
	if (22b)n	n < 0.5 ×	(23b), t	hen (240	c) = (23b	o); other	wise (24	c) = (22b	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,					•	ve input				0 51				
(24d)m=	<u> </u>	1 = 1, un	0.59	0.57	0.57	erwise (2	0.55	0.5 + [(2	20)III- X	0.5]	0.58	0.58		(24d)
) or (24				0.07	0.00	0.00		(2:0)
(25)m=	0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58		(25)
			I	I	I									
				paramet						• • • • • •				A X 1
ELEN	IENT	Gros area		Openin rr		Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²⋅ł		A X k kJ/K
Doors						2	x	1	=	2				(26)
Windo	ws Type	e 1				7.06	x1	/[1/(1.4)+	0.04] =	9.36				(27)
Windo	ws Type	2				3.74	x1	/[1/(1.4)+	0.04] =	4.96				(27)
Floor 7	Гуре 1					2.292	<u>2</u> x	0.13	=	0.2979	3			(28)
Floor 7	Гуре 2					48.92	3 X	0.13	=	6.35999	Э			(28)
Walls	Type1	41.9)4	10.8	3	31.14	4 ×	0.18	=	5.6				(29)
Walls	Type2	5.6	2	2		3.62	x	0.18	=	0.65	_		7	(29)
Total a	area of e	lements	, m²			98.77	7							(31)
				effective wi nternal wal			ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
			= S (A x		, ,			(26)(30)) + (32) =			[29.23	(33)
Heat c	apacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	6039.99	
Therm	al mass	parame	ter (TMF		- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	-		ere the de tailed calc		construct	ion are noi	t known pr	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Therm	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix ł	<					[7.63	(36)
if details	s of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	:1)						· ·		
Total f	abric he	at loss							(33) +	(36) =			36.86	(37)
Ventila	ation hea		1	d monthly	Í	1	ı —		(38)m	= 0.33 × (25)m x (5)) 1		
<i>/</i>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	25.22	25.06	24.91	24.17	24.04	23.4	23.4	23.28	23.64	24.04	24.31	24.6		(38)
	ransfer o		r	r	I		r			= (37) + (3	-	,		
(39)m=	62.08	61.92	61.77	61.04	60.9	60.26	60.26	60.14	60.51	60.9	61.18	61.47	64.04	(39)
										Average =	Juii(39)₁	12 / 1 🖊 =	61.04	(33)

Heat lo	oss para	ımeter (l	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.21	1.21	1.21	1.19	1.19	1.18	1.18	1.17	1.18	1.19	1.19	1.2		
Numbe	er of day	/s in mo	nth (Tah	le 12)		1				Average =	Sum(40)1	12 /12=	1.19	(40)
Numbe	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								1		<u> </u>				
4. Wa	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				(1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (⁻	TFA -13		73		(42)
Annua <i>Reduce</i>	l averag	je hot wa al average	hot water		5% if the c	lwelling is	designed	(25 x N) to achieve		se target o		.19		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	r day for e	ach month	Vd,m = fa	ctor from	Table 1c x	: (43)						
(44)m=	82.71	79.7	76.69	73.69	70.68	67.67	67.67	70.68	73.69	76.69	79.7	82.71		-
Energy	content of	hot water	used - ca	lculated m	onthly = 4.	190 x Vd,r	m x nm x L)))))))))))))))))))			m(44) ₁₁₂ = ables 1b, 1		902.29	(44)
(45)m=	122.66	107.28	110.7	96.51	92.6	79.91	74.05	84.97	85.99	100.21	109.39	118.79		
(-)											m(45) ₁₁₂ =		1183.04	(45)
lf instan	taneous w	/ater heati	ng at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46) to (61)					
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage		includir	na anv si	olar or M	///HRS	storane	within sa	ame ves	دما		150		(47)
If comr Otherv Water	munity h vise if no storage	neating a o stored loss:	and no ta hot wate	ank in dw	velling, e ncludes i	nter 110 nstantar) litres in neous co				47)	0		(48)
		actor fro					"day).					0		(49)
•				e, kWh/ye	ear			(48) x (49)) =		L	0		(50)
b) If m	nanufact	urer's d	eclared	cylinder	loss fact							-		. ,
		age loss neating s		rom Tabl on 4.3	le 2 (kW	h/litre/da	ay)				(0		(51)
		from Ta									(0		(52)
Tempe	erature f	actor fro	m Table	e 2b							(0		(53)
•••		om wateı (54) in (5	-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0 0		(54) (55)
	. ,	. , .		for each	month			((56)m = (55) × (41)	m		0		(00)
(56)m=	0	0	0	0	0	0	0		0	0	0	0		(56)
	-	s dedicate	d solar sto	prage, (57)	-			-	-	-	H11) is fro	-	ix H	. ,
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3						(0		(58)
Primar	y circuit	loss cal	culated	for each	month (. ,	65 × (41)						
		· · · · · ·		1	· · · · · ·	1	r	ng and a	<u> </u>	1	, 			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)

(61)m- 0 <th>Combi</th> <th>loss ca</th> <th>lculated</th> <th>for ea</th> <th>ch</th> <th>month (</th> <th>(61)m =</th> <th>(60</th> <th>D) ÷ 36</th> <th>65 × (41)</th> <th>m</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	Combi	loss ca	lculated	for ea	ch	month ((61)m =	(60	D) ÷ 36	65 × (41)	m						
(a2)me 104 28 91.18 94.98 82.03 78.71 67.92 62.94 72.23 73.09 86.18 92.98 100.97 (62) Solar DHW input calculated using Appendix 6 or Appendix H (regative quantity) (retter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) Gamme 0	(61)m=	0	0	0		0	0		0	0	0	0	0	0	0		(61)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0 if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (add) (63)me 0	Total h	eat req	uired for	water	he	ating ca	alculated	d fo	or eacl	n month	(62)m	= 0.85 ×	(45)m	+ (46)m +	(57)m +	(59)m + (61)m	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) (63) 0<	(62)m=	104.26	91.18	94.09	9	82.03	78.71	6	67.92	62.94	72.23	73.09	85.18	92.98	100.97]	(62)
(63)m: 0 <td>Solar DH</td> <td>IW input</td> <td>calculated</td> <td>using A</td> <td>Nppe</td> <td>endix G or</td> <td>· Appendi></td> <td>ίΗ</td> <td>(negativ</td> <td>ve quantity</td> <td>) (enter</td> <td>'0' if no sol</td> <td>ar contrib</td> <td>ution to wat</td> <td>er heating)</td> <td>-</td> <td></td>	Solar DH	IW input	calculated	using A	Nppe	endix G or	· Appendi>	ίΗ	(negativ	ve quantity) (enter	'0' if no sol	ar contrib	ution to wat	er heating)	-	
Output from water heater (e4)me 104.26 91.18 94.09 82.03 78.71 67.92 62.94 72.23 73.09 85.18 92.98 100.97 Output from water heating, KWh/month 0.25 [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] 1005.58 (64) (65)me 22.6 22.8 23.52 20.51 19.86 16.98 15.74 18.06 18.27 21.92 23.42 25.24 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5 5 5 5 5 5 5 5 66.3 86.3 86.3 86.3 86.3 86.3 86.3 86.3 86.3 86.3 86.3 66.9 5 66.9 1 67.7 7 7.35 5.49 4.64 5.01 6.51 8.74 11.1 1.2.96 13.81 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 66.9 69.9 148.02 139.64 129.04 110.51 110.85 114.81 123.25 133.82 143.75	(add a	dditiona	al lines if	FGHF	RS a	and/or \	WWHRS	S ap	plies,	, see Ap	pendix	G)					
(64)me 104.26 91.18 94.09 82.03 78.71 67.92 62.94 72.23 73.09 85.18 92.98 100.37 Output from water heating, kWh/month 0.25 [0.85 x (45)m + (61)m] + 0.8 x [(48)m + (57)m + (59)m] (64)me 22.8 23.52 20.51 19.86 16.98 15.74 18.06 18.27 21.92 23.42 25.24 (65) Include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (rable 5). Wats Geime Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66) Igen: (rable 5). Wats (rable failed in Appendix L, equation L9 or L9a), also see Table 5 (Ge)me 13.44 11.94 9.71 7.35 5.49 4.64 5.01 6.51 8.74 11.1 1.2.96 13.81 (67) Appendix L, equation L13 or L13a), also see Table 5 (60)me 150.39 15.35 148.02 13.64 13.63 31.63 31	(63)m=	0	0	0		0	0		0	0	0	0	0	0	0]	(63)
Output from water heater (annual)	Output	from w	ater hea	ter								-		-		-	
Heat gains from water heating, kWh/month 0.25 ' [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (66)m = 26.06 22.8 23.52 20.51 19.68 16.99 15.74 16.06 18.27 21.29 23.24 25.24 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts $\begin{array}{c} Jan & Feb & Mar & Apr & May & Jun & Jul & Aug & Sep & Oct & Nov & Dec \\ 660m = & 86.3 & 8$	(64)m=	104.26	91.18	94.0	э	82.03	78.71	6	67.92	62.94	72.23	73.09	85.18	92.98	100.97		
				•							0	utput from v	vater hea	ter (annual)	112	1005.58	(64)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Wats (66)m= 86.3	Heat g	ains fro	m water	heatir	ng,	kWh/m	onth 0.2	5 ′	[0.85	× (45)m	+ (61	m] + 0.8	x [(46)ı	n + (57)m	1 + (59)m	n]	
5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts (6)m= Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (6)m= 86.3<	(65)m=	26.06	22.8	23.5	2	20.51	19.68	1	6.98	15.74	18.06	18.27	21.29	23.24	25.24]	(65)
5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts (6)m= Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (6)m= 86.3<	inclu	ude (57)	m in calo	ulatio	n o	f (65)m	only if c	ı vlir	nder is	s in the c	dwellin	g or hot v	vater is	from corr	nmunity h	neating	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $. ,				. ,	-	,				0			ý	J	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							/•										
	Metab						May	Γ	lun	hul	Διιά	Sen		Nov	Dec	1	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 13.44 11.94 9.71 7.35 5.49 4.64 5.01 6.51 8.74 11.1 12.96 13.81 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 150.39 151.95 148.02 139.64 129.08 119.14 112.51 110.95 114.88 123.25 133.82 143.75 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 (69) Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0	(66)m =				-	-		-				<u> </u>					(66)
													00.0	00.0	00.0	1	(00)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 150.39 151.95 148.02 139.64 129.08 119.14 112.51 110.95 114.88 123.25 133.82 143.75 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 31.63 (69) Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0	-	<u> </u>	<u>`</u>		<u> </u>		· · ·	-		, 		1	44.4	12.00	12.01	1	(67)
														12.90	13.01]	(07)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 31.63 $31.$			<u>,</u>	r	_			1						-	1	1	(00)
$\begin{array}{c} (69) m = & \hline 31.63 & 31$								L						5 133.82	143.75	J	(68)
Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0	Cookir	ng gains	s (calcula	ted in	Ар	pendix	L, equa	tior	1 L15	or L15a)	, also	see Tabl	e 5			•	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(69)m=	31.63	31.63	31.6	3	31.63	31.63	3	81.63	31.63	31.63	31.63	31.63	31.63	31.63		(69)
Losses e.g. evaporation (negative values) (Table 5) (71)m= -69.04 $-69.$	Pumps	and fa	ns gains	(Tabl	e 5	a)							_			_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(70)m=	0	0	0		0	0		0	0	0	0	0	0	0		(70)
Water heating gains (Table 5) (72)m= 35.03 33.92 31.62 28.48 26.45 23.58 21.15 24.27 25.38 28.62 32.28 33.93 (72) Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m (73)m= 247.75 246.7 238.23 224.37 209.91 196.26 187.56 190.62 197.89 211.87 227.95 240.38 (73) 6. Solar gains: Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area m ² Flux g_ g FF Gains (W) Southeast $0.9x$ 0.77 x 3.74 x 36.79 x 0.63 x 0.7 $=$ 42.06 (77) Southeast $0.9x$ 0.77 x 3.74 x 36.79 x 0.63 x 0.7 $=$ 42.06 (77) Southeast $0.9x$ 0.77 x 3.74 x 36.79	Losses	s e.g. e\	vaporatio	n (ne	gati	ve valu	es) (Tab	ole	5)								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	(71)m=	-69.04	-69.04	-69.0	4	-69.04	-69.04	-(69.04	-69.04	-69.04	-69.04	-69.04	4 -69.04	-69.04]	(71)
Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m (73)m= 247.75 246.7 238.23 224.37 209.91 196.26 187.56 190.62 197.89 211.87 227.95 240.38 (73) 6. Solar gains: Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area Table 6a Flux g_ FF Gains Table 6b Table 6c (W) Southeast $0.9x$ 0.77 x 36.79 x 0.63 x 0.63 (77) Southeast $0.9x$ 0.77 x 36.79 x 0.63 x 0.63 (77) Southeast $0.9x$ 0.77 x 36.79 x 0.63 x 0.63 (77) Southeast $0.9x$ 0.77 x 36.79 x 0.63 x 0.63 x 0.63 x 0	Water	heating	gains (T	able :	5)			-				-	-	-		-	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	(72)m=	35.03	33.92	31.6	2	28.48	26.45	2	23.58	21.15	24.27	25.38	28.62	32.28	33.93]	(72)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Total i	nternal	gains =						(66)	m + (67)m	+ (68)r	n + (69)m +	(70)m +	(71)m + (72)m	2	
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area m^2 Flux g FF Gains (W) Southeast 0.9x 0.77 x 3.74 x 36.79 x 0.63 x 0.7 = 42.06 (77) Southeast 0.9x 0.77 x 3.74 x 62.67 x 0.63 x 0.7 = 71.64 (77) Southeast 0.9x 0.77 x 3.74 x 85.75 x 0.63 x 0.7 = 98.01 (77)			<u> </u>		3	224.37	209.91	1	96.26	187.56	190.6	2 197.89	211.8	7 227.95	240.38]	(73)
Orientation:Access Factor Table 6dArea m²Flux Table 6a g_{-} Table 6bFF Table 6cGains (W)Southeast $0.9x$ 0.77 \times 3.74 \times 36.79 \times 0.63 \times 0.7 $=$ 42.06 (77) Southeast $0.9x$ 0.77 \times 3.74 \times 62.67 \times 0.63 \times 0.7 $=$ 42.06 (77) Southeast $0.9x$ 0.77 \times 3.74 \times 62.67 \times 0.63 \times 0.7 $=$ 71.64 (77) Southeast $0.9x$ 0.77 \times 3.74 \times 85.75 \times 0.63 \times 0.7 $=$ 98.01 (77)	6. So	lar gain	s:	1								ł	1			•	
Table 6d m^2 Table 6aTable 6bTable 6bTable 6c(W)Southeast $0.9x$ 0.77 x 3.74 x 36.79 x 0.63 x 0.7 $=$ 42.06 (77)Southeast $0.9x$ 0.77 x 3.74 x 62.67 x 0.63 x 0.7 $=$ 71.64 (77)Southeast $0.9x$ 0.77 x 3.74 x 85.75 x 0.63 x 0.7 $=$ 98.01 (77)	Solar g	ains are	calculated	using s	olar	flux from	Table 6a	and	l associ	ated equa	tions to	convert to t	he applic	able orienta	tion.		
Southeast $_{0.9x}$ 0.77 x 3.74 x 36.79 x 0.63 x 0.7 $=$ 42.06 (77) Southeast $_{0.9x}$ 0.77 x 3.74 x 62.67 x 0.63 x 0.7 $=$ 71.64 (77) Southeast $_{0.9x}$ 0.77 x 3.74 x 85.75 x 0.63 x 0.7 $=$ 98.01 (77)	Orienta	ation:	Access F	actor		Area			Flu	х		g_		FF		Gains	
Southeast $0.9x$ 0.77 x 3.74 x 62.67 x 0.63 x 0.7 = 71.64 (77) Southeast $0.9x$ 0.77 x 3.74 x 62.67 x 0.63 x 0.7 = 71.64 (77) Southeast $0.9x$ 0.77 x 3.74 x 85.75 x 0.63 x 0.7 = 98.01 (77)		-	Table 6d			m²			Tab	ole 6a		Table 6b)	Table 6c		(W)	
Southeast $0.9x$ 0.77 x 3.74 x 85.75 x 0.63 x 0.77 = 98.01 (77)	Southe	ast <mark>0.9x</mark>	0.77		x	3.7	′ 4	x	3	6.79	x	0.63	x	0.7	=	42.06	(77)
Southeast $0.9x$ 0.77 x 3.74 x 85.75 x 0.63 x 0.7 = 98.01 (77)	Southe	ast <mark>0.9x</mark>	0.77	Ē	x	3.7	′ 4	x	6	2.67	×	0.63	×	0.7	=	71.64	- (77)
	Southe	ast <mark>0.9x</mark>	0.77		x	3.7	74	x			×		×	0.7	=		4
	Southe	ast <mark>0.9x</mark> [x						×Г		⊢ ×		=		
Southeast 0.9x 0.77 x 3.74 x 119.01 x 0.63 x 0.7 = 136.03 (77)	Southe	ast <mark>0.9x</mark> [=	x	r		x			×		×		=		

Southeast 0.9x	0.77	x	3.7	4	x	1	18.15	x	0.63	x	0.7	=	135.0)4 (77)
Southeast 0.9x	0.77	x	3.7	4	x	1	13.91] ×	0.63	x	0.7	=	130.	2 (77)
Southeast 0.9x	0.77	x	3.7	4	x	1(04.39	x	0.63	x	0.7	=	119.3	32 (77)
Southeast 0.9x	0.77	x	3.7	4	x	9	2.85	x	0.63	x	0.7	=	106.1	13 (77)
Southeast 0.9x	0.77	x	3.7	4	x	6	9.27	x	0.63	x	0.7	=	79.1	7 (77)
Southeast 0.9x	0.77	x	3.7	4	x	4	4.07	x	0.63	x	0.7	=	50.3	7 (77)
Southeast 0.9x	0.77	x	3.7	4	x	3	1.49	x	0.63	x	0.7	=	35.9	9 (77)
Southwest0.9x	0.77	x	7.0	6	x	3	6.79]	0.63	x	0.7	=	79.3	9 (79)
Southwest0.9x	0.77	x	7.0	6	x	6	2.67]	0.63	x	0.7	=	135.2	23 (79)
Southwest0.9x	0.77	x	7.0	6	x	8	5.75]	0.63	x	0.7	=	185.0)2 (79)
Southwest0.9x	0.77	x	7.0	6	x	1(06.25]	0.63	x	0.7	=	229.2	25 (79)
Southwest0.9x	0.77	x	7.0	6	x	1'	19.01]	0.63	X	0.7	=	256.	78 (79)
Southwest0.9x	0.77	x	7.0	6	x	1'	18.15]	0.63	x	0.7	=	254.9	92 (79)
Southwest0.9x	0.77	x	7.0	6	x	1'	13.91]	0.63	X	0.7	=	245.	77 (79)
Southwest0.9x	0.77	x	7.0	6	x	1(04.39]	0.63	X	0.7	=	225.2	24 (79)
Southwest0.9x	0.77	x	7.0	6	x	9	2.85]	0.63	x	0.7	=	200.3	34 (79)
Southwest0.9x	0.77	x	7.0	6	x	6	9.27]	0.63	x	0.7	=	149.4	45 (79)
Southwest0.9x	0.77	x	7.0	6	x	4	4.07]	0.63	x	0.7	=	95.0	9 (79)
Southwest _{0.9x}	0.77	x	7.0	6	x	3	1.49]	0.63	x	0.7	=	67.9	4 (79)
Solar gains in (83)m= 121.44 Total gains – i	206.86 28	3.04	350.7	392.81	3	89.97 83)m	375.97 , watts	<mark>(83)</mark> m 344	n = Sum(74)m .55 306.47		-	103.93]	(83)
(84)m= 369.19	453.56 52	1.27	575.06	602.72	5	86.22	563.53	535	.17 504.36	440.4	9 373.41	344.31		(84)
7. Mean inter	nal tempera	iture	(heating	seaso	n)				•		•	•	_	
Temperature			, o		<i>.</i>	area f	rom Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fac														
Jan	Feb N	Mar	Apr	Мау	,	Jun	Jul	A	ug Sep	Oct	Nov	Dec]	
(86)m= 1	0.99 0	.97	0.92	0.8	(0.63	0.46	0.5	51 0.74	0.94	0.99	1		(86)
Mean interna	l temperatu	re in l	iving are	ea T1 (follo	w ste	ps 3 to 7	7 in T	able 9c)				_	
(87)m= 19.79	20 20).29	20.61	20.85	2	0.97	20.99	20.	99 20.92	20.6	20.13	19.75]	(87)
Temperature	during heat	ing p	eriods ir	n rest o	f dw	elling	from Ta	able 9	9, Th2 (°C)	-		-	-	
(88)m= 19.91	<u> </u>	9.92	19.93	19.93	-	9.94	19.94	19.		19.93	3 19.92	19.92]	(88)
Utilisation fac	tor for gains	s for r	est of d	wellina	. h2.	m (se	e Table	9a)		•	•		-	
(89)m= 0.99	<u> </u>	.96	0.89	0.75	-	0.54	0.36	0.	4 0.66	0.92	0.99	1]	(89)
Mean interna	l temperatu	re in t	he rest	of dwe	llina	T2 (fr	ollow ste	eps 3	to 7 in Tal	ole 9c)			-	
(90)m= 18.82	<u> </u>	9.32	19.63	19.83		9.92	19.94	19.	- i	19.63	3 19.17	18.79]	(90)
L				1						fLA = Li	ving area ÷ (·	4) =	0.45	5 (91)
Mean interna	Itemperatu	re (fo	r the wh	مام طبير	ollin	a) – ti	Δ 🗸 Τ1	⊥ (1	_ fl Δ) 🗸 Τ΄	2			L	1
mean mento						<u>97 – 11</u>		<u>' \ '</u>		-			-	

						0,							_
(92)m=	19.25	19.47	19.75	20.07	20.29	20.39	20.41	20.41	20.36	20.07	19.6	19.22	(92)
								4					•

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

(93)m=	19.25	19.47	19.75	20.07	20.29	20.39	20.41	20.41	20.36	20.07	19.6	19.22		(93)
8. Spa	ace hea	ting requ	uiremen	t										
				mperatu using Ta		ned at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm					. <u> </u>	·					
(94)m=	0.99	0.98	0.96	0.89	0.77	0.58	0.4	0.45	0.69	0.92	0.98	0.99		(94)
Usefu	l gains,	hmGm	, W = (9	4)m x (84	4)m	1	1	1				11		
(95)m=	366.57	445.26	498.31	513.16	, 462.11	337.59	228.04	238.59	350.42	405.46	367.52	342.51	I	(95)
Month	ly aver	age exte	rnal tem	nperature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	e for mea	an interr	nal tempe	erature,	Lm , W =	- =[(39)m :	x [(93)m	– (96)m	1				
(97)m=	928.32	902.24	818.67	681.91	523.16	349.05	229.67	241.19	378.62	576.47	764.52	923.09		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon ⁻	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	417.94	307.09	238.35	121.5	45.42	0	0	0	0	127.23	285.84	431.95		
ľ		<u>I</u>		!	I	!		Tota	l per year	(kWh/yeai) = Sum(9	8)15,912 =	1975.32	(98)
Space	e heatin	g require	ement in	n kWh/m²	²/year								38.57	(99)
8c. Sr	bace co	oling rec	uiremer	nt										
				August.	See Tal	ble 10b								
Calcu	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I				using 2				-	· ·			able 10)		
(100)m=	0	0	0	0	0	566.46	445.94	457.09	0	0	0	0		(100)
Utilisa	tion fac	tor for lo	u Diss hm											
(101)m=	0	0	0	0	0	0.92	0.96	0.95	0	0	0	0		(101)
· · · ·	l loss. h	i mLm (V	vatts) =	1 (100)m x	(101)m	I								
(102)m=	0	0	0	0	0	523.75	429.22	435.08	0	0	0	0		(102)
· · I	(solar (i Dains ca	l Iculated	for appli	cable w	eather re	eaion. se	e Table	L 10)					
(103)m=	0	0	0	0	0	750.41	722.65	690.47	0	0	0	0		(103)
•						dwelling,	continue	ous (kW	h) = 0.0	24 x [(10)3)m – (102)m]>	« (41)m	
set (1 (104)m=	04)11110		0	< 3 × (98	0	163.2	218.31	190.01	0	0	0	0		
(104)11=	0	0	0	0	0	103.2	210.31	190.01				<u> </u>		
Cooled	fractio	2								= Sum(104) area ÷ (4	= 1)_	571.53	(104) (105)
		i actor (Ta	ahle 10h	N .					10 -	cooleu	alea ÷ (*	+) -	1	(103)
(106)m=	0			0	0	0.25	0.25	0.25	0	0	0	0		
(,		-								l = Sum(=	0	(106)
Space	coolina	requirer	nent for	month =	: (104)m	× (105)	× (106)r	n	10101	= Ourri	1.00	- I		
(107)m=	0	0	0	0	0	40.8	54.58	47.5	0	0	0	0		
, ,									Total	= Sum(1 <u>0</u> 7)	=	142.88	(107)
Space	cooling	requirer	ment in l	kWh/m²/y	/ear				(107)) ÷ (4) =			2.79	(108)
8f. Fab	ric Ene	rgy Effici	iency (ca	alculated	l only un	der speo	cial cond	litions, s	ee sectio	on 11)				-
Fabric	Energ	y Efficier	псу						(99) -	+ (108) =	=		41.36	(109)
Targe	t Fabri	c Energ	y Efficie	ency (TF	EE)								47.56	(109)

		Use	er Details:						
Assessor Name:	Zahid Ashraf		Stroma	a Numb	ber:		STRO	001082	
Software Name:	Stroma FSAP 20	12	Softwa	re Ver	sion:		Versio	n: 1.0.5.9	
		Prope	erty Address:	Plot 16					
Address :									
1. Overall dwelling dime	nsions:								
Ground floor			Area(m²) 51.22	(1a) x	Av. Hei	i ght(m) 5	(2a) =	Volume(m³ 128.04) (3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	e)+(1n)	51.22	(4)					_
Dwelling volume]	(3a)+(3b)-	+(3c)+(3d)+(3e)+	.(3n) =	128.04	(5)
2. Ventilation rate:									
		econdary heating	other		total			m ³ per hou	ſ
Number of chimneys	0 +	0 +	0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0 +	0	i = 🗖	0	x 2	20 =	0	(6b)
Number of intermittent far	าร				0	x 1	0 =	0	(7a)
Number of passive vents					0	x 1	0 =	0	(7b)
Number of flueless gas fir	es				0	x 4	40 =	0	(7c)
							Air ch	anges per ho	
		0-)-(0))-(7-)-(7	1 -) - (7 -)	_				anges per no	_
Infiltration due to chimney If a pressurisation test has be				ontinue fro	0		÷ (5) =	0	(8)
Number of storeys in th			<i>, ouror moo o</i>		<i>iii</i> (0) io (10)	[0	(9)
Additional infiltration	0 ()					[(9)-	1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber	frame or 0.35	5 for masonr	y constru	uction		İ	0	(11)
if both types of wall are pro-		sponding to the g	greater wall area	a (after					_
deducting areas of openin If suspended wooden fl		aled) or 0.1 (se	ealed). else (enter 0			[0	(12)
If no draught lobby, ent		(-	,					0	(13)
Percentage of windows	and doors draught s	tripped						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 10	= [00			0	(15)
Infiltration rate			(8) + (10) +	- (11) + (12	2) + (13) +	+ (15) =	İ	0	(16)
Air permeability value,	q50, expressed in cu	bic metres pe	r hour per so	luare me	etre of e	nvelope	area	3	(17)
If based on air permeabili								0.15	(18)
Air permeability value applies	•	as been done or a	a degree air per	meability is	s being us	sed	I		
Number of sides sheltered Shelter factor	a		(20) = 1 - [0.075 x (19	9)] =			2 0.85	(19) (20)
Infiltration rate incorporati	ng shelter factor		(21) = (18)		/-		l	0.85	(21)
Infiltration rate modified for	0	d	. , . ,					0.15	
	Mar Apr May	1 1	ul Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7			•					
r	4.9 4.4 4.3	3.8 3.	8 3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	$p_{m} \pm 4$			I					
	1.23 1.1 1.08	0.95 0.9	95 0.92	1	1.08	1.12	1.18		
						_	-		

Adjust	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
~ ' '	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se						0.5	(23a)
				endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)), other	wise (23b) = (23a)			0.5	(23b)
			0 11		, ,	, ,	• •	n Table 4h)	,	, , ,			79.05	(23c)
			-	-	-			/ HR) (24a		2b)m + (;	23b) x [1 – (23c)		(200)
(24a)m=	r	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25		(24a)
b) If	balance	ed mecha	ı anical ve	ntilation	without	heat rec	L Coverv (N	MV) (24b)m = (22	2b)m + (2	23b)		I	
(24b)m=	r	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	i ouse ex	ract ver	tilation o	n pripositiv	re input v	ı ventilatio	on from c	outside			<u> </u>	1	
,					•	•		c) = (22b		5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
								on from I				-		
	r Ó	r	en (24d)	m = (22l	,	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]		r	1	
(24d)m=		0	0	0	0	0	0	0	0	0	0	0		(24d)
	r	<u> </u>	i	· · ·	, <u>,</u>	, <u>,</u>	<u>, ,</u>	d) in box	. ,	· · · · ·		<u>.</u>	1	
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25		(25)
3. He	at losse	s and he	eat loss p	paramete	er:									
ELEN	IENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/ł	<)	k-value kJ/m²⋅l		∖Xk J/K
Doors						2	x	1.4	=	2.8				(26)
Windo	ws Type	e 1				8.651	x1	/[1/(1.4)+	0.04] =	11.47				(27)
Windo	ws Type	e 2				4.579) x1	/[1/(1.4)+	0.04] =	6.07				(27)
Floor 7	Гуре 1					2.292	2 X	0.12		0.27504	[(28)
Floor 7	Гуре 2					48.92	3 X	0.12		5.87076	i		\exists	(28)
Walls ⁻	Type1	41.9	94	13.2	3	28.71	x	0.15	= =	4.31	= i		\dashv	(29)
Walls ⁻	Type2	5.6	2	2		3.62		0.14		0.51			\dashv	(29)
		elements				98.77			I	0.01	L			(31)
				effective wi	ndow U-va			g formula 1,	/[(1/U-valu	ıe)+0.04] a	is qiven in	paragraph	1 3.2	(01)
		as on both					J			, -	U	, , ,		
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				31.3	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	6005.97	(34)
Therm	al mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value:	Low		100	(35)
	0	sments wh ad of a de			construct	ion are not	t known pr	recisely the	indicative	values of	TMP in T	able 1f		
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						9.68	(36)
		al bridging	are not kn	own (36) =	= 0.05 x (3	1)				(2.2)				
	abric he									(36) =			40.98	(37)
Ventila		at loss ca	i							= 0.33 × (1	1	
(00)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m=	11.29	11.16	11.03	10.35	10.22	9.54	9.54	9.41	9.81	10.22	10.49	10.76		(38)
			r			_	_	_	. ,	= (37) + (3	,		1	
(39)m=	52.28	52.14	52.01	51.34	51.2	50.53	50.53	50.39	50.8	51.2	51.47	51.74	54 0	(39)
										Average =	Juni(39)1	12 / 1 🚄	51.3	(38)

Heat le	oss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.02	1.02	1.02	1	1	0.99	0.99	0.98	0.99	1	1	1.01		
Numb	er of day	s in mo	nth (Tab	le 1a)	1	1		!	,	Average =	Sum(40) ₁ .	12 /12=	1	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
								I						
4. Wa	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF	ned occu FA > 13.9 FA £ 13.9	9, N = 1		: [1 - exp	(-0.0003	349 x (TF	-A -13.9)2)] + 0.(0013 x (⁻	TFA -13.		73		(42)
Reduce		al average	hot water	usage by	5% if the a	welling is	designed	(25 x N) to achieve		se target o		.15		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres pei	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	87.06	83.9	80.73	77.56	74.4	71.23	71.23	74.4	77.56	80.73	83.9	87.06		_
Energy	content of	hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		949.77	(44)
(45)m=	129.11	112.92	116.52	101.59	97.48	84.12	77.95	89.44	90.51	105.48	115.14	125.04		
16 :										Total = Su	m(45) ₁₁₂ =		1245.3	(45)
			· ·					boxes (46						(10)
(46)m= Water	19.37 storage	16.94 loss:	17.48	15.24	14.62	12.62	11.69	13.42	13.58	15.82	17.27	18.76		(46)
	-		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If com	munity h	eating a	ind no ta	ank in dw	velling, e	nter 110	litres in	(47)						
			hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage nanufact		aclarad I	oss fact	or ie kno	wp (k\//	v(dav).					_		(48)
	erature f						vuay).					0		(40)
•	y lost fro				ear			(48) x (49) =			10		(50)
	nanufact		•			or is not	known:	(/	/		'	10		(00)
	ater stor	-			le 2 (kW	h/litre/da	ay)				0.	02		(51)
	munity h le factor	-		on 4.3								00		(50)
	erature f			2b								03 .6		(52) (53)
	y lost fro				aar			(47) x (51)) x (52) x (^j	53) -				(54)
-	(50) or (-	, itt vii/yt	Jul			() (0	/ / (0_) / (,		03 03		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
		s dedicate	l d solar sto	nage, (57)	m = (56)m	x [(50) – (1 60), else (5	1 7)m = (56)	m where (m Append	ix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Prima	ry circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
Prima	ry circuit	loss cal	culated	for each	month (• •	65 × (41)						
			· · · · · ·	r	· · · · · ·	i	i	ng and a	· ·	1	, 			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

(61)m= 0 </th <th></th>	
(62)m= 184.39 162.85 171.8 155.08 152.75 137.61 133.22 144.72 144.01 160.76 168.64 180.31 (62 Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)m= 0)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)m= 0)
$ \begin{array}{c} (add \ additional \ lines \ if \ FGHRS \ and/or \ WWHRS \ applies, \ see \ Appendix \ G) \\ (63)m= \begin{tabular}{ c c c c c c } \hline 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0$	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Output from water heater $(64)m=$ 184.39 162.85 171.8 155.08 152.75 137.61 133.22 144.72 144.01 160.76 168.64 180.31 Output from water heater (annual) 112 1896.14 (64) Heat gains from water heating, kWh/month 0.25 \cdot [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65)m= $(65)m=$ 87.15 77.49 82.97 76.57 76.63 70.76 70.14 73.96 72.89 79.29 81.08 85.8 (65)m include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts (66)m= 103.55 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$)
Output from water heater (annual) 1896.14 (64 Heat gains from water heating, kWh/month $0.25 \cdot [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (65)m= $87.15 77.49 82.97 76.57 76.63 70.76 70.14 73.96 72.89 79.29 81.08 85.8$ (65)m= (65)m= (65)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating (65)m= 5. Internal gains (see Table 5 and 5a): (66)m= (66)m= 103.55 103	
Heat gains from water heating, kWh/month $0.25 \ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (65)m= 87.15 77.49 82.97 76.57 76.63 70.76 70.14 73.96 72.89 79.29 81.08 85.8 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 (66)	
(65)m= 87.15 77.49 82.97 76.57 76.63 70.76 70.14 73.96 72.89 79.29 81.08 85.8 (65 include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 (66)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55<)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55	
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 103.55	
(66)m= 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 103.55 (66	
)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 33.52 29.77 24.21 18.33 13.7 11.57 12.5 16.25 21.81 27.69 32.32 34.45 (67))
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 224.46 226.79 220.92 208.43 192.65 177.83 167.92 165.59 171.46 183.96 199.73 214.56 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 47.08 (69)
Pumps and fans gains (Table 5a)	·
(70)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0
Losses e.g. evaporation (negative values) (Table 5)	·
$ (71)m = \begin{array}{c ccccccccccccccccccccccccccccccccccc$)
	<i>.</i>
Water heating gains (Table 5) (72)m= 117.14 115.31 111.51 106.35 103 98.28 94.27 99.41 101.24 106.58 112.61 115.32 (72)	0
	<i>,</i>
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$ (73)m= 456.72 453.47 438.24 414.71 390.95 369.28 356.29 362.85 376.11 399.83 426.26 445.92 (73)	0
6. Solar gains:	,
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.	
Orientation: Access Factor Area Flux g_ FF Gains	
Table 6d m^2 Table 6aTable 6bTable 6c(W)	
Southeast 0.9x 0.77 x 4.58 x 36.79 x 0.63 x 0.7 = 51.49 (77	.)
Southeast 0.9x 0.77 x 4.58 x 62.67 x 0.63 x 0.77 = 87.71 (77	
Southeast $0.9x$ 0.77 x 4.58 x 85.75 x 0.63 x 0.7 = 120 (77)
Southeast $0.9x$ 0.77 x 4.58 x 106.25 x 0.63 x 0.77 = 148.69 (77	
Southeast 0.9x 0.77 x 4.58 x 119.01 x 0.63 x 0.7 = 166.54 (77	')

Southe	ast <mark>0.9x</mark>	0.77	>	4.	58	×	1	18.15	x	0.63	x	0.7	=	165.34	(77)
Southe	ast <mark>0.9x</mark>	0.77	>	4.	58	×	1	13.91	x	0.63	x	0.7	=	159.4	(77)
Southe	ast <mark>0.9x</mark>	0.77)	4.	58	×	1	04.39	x	0.63	x	0.7	=	146.08	(77)
Southe	ast <mark>0.9x</mark>	0.77	>	4.	58	×	9	92.85	x	0.63	x	0.7	=	129.94	(77)
Southe	ast <mark>0.9x</mark>	0.77	>	4.	58	×	6	69.27	x	0.63	x	0.7	=	96.93	(77)
Southe	ast <mark>0.9x</mark>	0.77)	4.	58	×	4	14.07	x	0.63	x	0.7	=	61.67	(77)
Southe	ast <mark>0.9x</mark>	0.77)	4.	58	×	3	31.49	x	0.63	x	0.7	=	44.06	(77)
Southw	vest <mark>0.9x</mark>	0.77)	8.	65	×	3	36.79	Ī	0.63	x	0.7	=	97.28	(79)
Southw	vest <mark>0.9x</mark>	0.77	>	8.	65	×	6	62.67	Ī	0.63	x	0.7	=	165.7	(79)
Southw	est <mark>0.9x</mark>	0.77	>	8.	65	×	8	35.75	1	0.63	x	0.7	=	226.72	(79)
Southw	est <mark>0.9x</mark>	0.77)	8.	65	×	1	06.25	1	0.63	x	0.7	=	280.91	(79)
Southw	est <mark>0.9x</mark>	0.77)	8.	65	×	1	19.01	1	0.63	x	0.7	=	314.65	(79)
Southw	est <mark>0.9x</mark>	0.77	,	8.	65	×	1	18.15	1	0.63	×	0.7	=	312.37	(79)
Southw	est <mark>0.9x</mark>	0.77		8.	65	×	1	13.91	1	0.63	×	0.7	=	301.16	(79)
Southw	est <mark>0.9x</mark>	0.77		8.	65	×	1	04.39	1	0.63	×	0.7	=	275.99	(79)
Southw	est <mark>0.9x</mark>	0.77		8.	65	×		92.85	Ī	0.63	×	0.7	=	245.49	(79)
Southw	est <mark>0.9x</mark>	0.77		8.	65	×	6	69.27	ĺ	0.63	×	0.7	= =	183.13	(79)
Southw	est <mark>0.9x</mark>	0.77	>	8.	65	×	4	14.07	ĺ	0.63	×	0.7	= =	116.52	(79)
Southw	vest <mark>0.9x</mark>	0.77	,	8.	65	×		31.49	1	0.63	×	0.7	=	83.25	(79)
	L								-						
Solar o	ains in	watts. ca	alculate	d for ead	h mon	th			(83)m	i = Sum(74)m	(82)m				
(83)m=	148.77	253.41	346.72	429.6	481.1		77.71	460.56	422		280.07	7 178.19	127.31]	(83)
Total g	jains – ii	nternal a	and sola	r (84)m	- = (73)n	n + ((83)m	, watts	1	<u>₽</u>				J	
(84)m=	605.48	706.88	784.96	844.31	872.1	4 E	346.99	816.86	784	.93 751.53	679.8	9 604.45	573.24]	(84)
7. Me	an inter	nal temr	berature	(heating	n seaso	on)			•	•		•	•	_	
							area	from Tal	ole 9	Th1 (°C)				21	(85)
-		•	-	living ar		-									
	Jan	Feb	Mar	Apr	Ma	<u> </u>	Jun	Jul	A	ug Sep	Oct	Nov	Dec]	
(86)m=	0.85	0.8	0.72	0.62	0.5		0.37	0.27	0.2		0.64	0.8	0.87		(86)
Mean	interna	l temper	ature in	living a	ea T1	(follo	ow ste	ns 3 to 7	r 7 in T	able 9c)				4	
(87)m=	19.7	19.99	20.32	20.64	20.84	Ì	20.95	20.99	20.	<u>′</u>	20.65	20.15	19.64]	(87)
				l	n root (l from To						1	
(88)m=	20.07	20.07	20.07	20.08	20.08	_	20.09	20.09		9, Th2 (°C)	20.08	20.08	20.07	1	(88)
									I	20.00	20.00	20.00	20.07		(00)
			r	rest of c	T	·		r	r Ó			0.70	0.05	1	(00)
(89)m=	0.84	0.78	0.7	0.59	0.46		0.32	0.21	0.2	.3 0.39	0.61	0.78	0.85		(89)
Mean		l temper	ature in	the rest	of dwe	elling	g T2 (f	ollow ste	ri	to 7 in Tab	le 9c)	-		-	
(90)m=	18.37	18.78	19.22	19.65	19.92	: :	20.05	20.09	20.		19.69		18.29		(90)
										1	fLA = Liv	ving area ÷ (4) =	0.45	(91)
Mean	interna	l temper	ature (f	or the wl	nole dw	/ellir	ng) = f	LA x T1	+ (1	– fLA) × T2					
(92)m=	18.97	19.32	19.72	20.1	20.33		20.46	20.49	20.	49 20.42	20.12	19.52	18.9]	(92)
Apply	. adjustn	oont to t	ha maa	n interne	l tomp	orati	uro fro	m Table	10	where appr	opriato	-	•	-	

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

r								1			1		1	
(93)m=	18.97	19.32	19.72	20.1	20.33	20.46	20.49	20.49	20.42	20.12	19.52	18.9		(93)
			uirement					T 1 1 01		· .	70)			
			ernal ter	•		ied at ste	ep 11 of	Table 9t	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	tion fac	tor for g	ains, hm	:										
(94)m=	0.82	0.76	0.69	0.59	0.47	0.34	0.24	0.26	0.4	0.61	0.76	0.83		(94)
Usefu	-	hmGm	, W = (94	4)m x (84	4)m									
(95)m=	495.16	537.63	539.78	495.25	408.16	286.42	194.03	202.73	304.36	413.57	459.4	477.44		(95)
r		-	rnal tem			· · · · · ·							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)
r			an intern 687.32			i	- ,	x [(93)m	. ,	r ī	000.44	700.44	l	(07)
(97)m=	766.91	752.08		574.72	442	295.92	196.52	205.96 24 x [(97)	321.04	487.52	639.14	760.44		(97)
(98)m=	202.18	144.11	109.77	57.22	25.18	0	n = 0.02	24 X [(97)	0	55.02	129.41	210.55		
(00)11-	202.10	177.11	100.77	01.22	20.10	Ů	0				r) = Sum(9		933.44	(98)
Creat	haatia	~ ~ ~ ~			lucor.			Tota	r por your	(ittiniyedi		0)15,912 -		4
			ement in		•								18.23	(99)
			nts – Cor											
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301)														(301)
													(302)	
Fraction of space heat from community system 1 – (301) = 1 The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter													(302)	
	-	-						allows for See Appel		up to tour	otner neat	sources; ti	ne latter	
			Commun										1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commi	unity hea	iting sys	tem			1	(305)
Distribu	ution los	s factor	(Table 1	2c) for c	commun	ity heatir	ng syste	m					1.05	(306)
Space	heating	9											kWh/yea	r
Annual	space	heating	requirem	nent									933.44	
Space	heat fro	m Comr	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	980.11	(307a)
Efficier	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space	heating	require	ment froi	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating	1												
			equirem	ent									1896.14	
			ty schem nunity bo						(64) x (30	03a) x (30	5) x (306) :	=	1990.95	(310a)
Electric	city used	d for hea	t distribu	ution				0.01	× [(307a)	(307e) +	- (310a)([310e)] =	29.71	(313)
Cooling	g Syster	n Energ	y Efficiei	ncy Rati	C								0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0) $= (107) \div (314) = 0$												0	(315)	
Electric	city for p	umps a	nd fans v	within dv	velling (1	Table 4f)	:							_
mecha	nical ve	ntilation	- balanc	ed, extra	act or po	sitive in	out from	outside					177.68	(330a)

warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/y	/ear	=(330a) + (330b) + (330g) =	177.68	(331)
Energy for lighting (calculated in Ap	pendix L)		236.78	(332)
Electricity generated by PVs (Apper	idix M) (negative quantity)		-518.71	(333)
Electricity generated by wind turbine	(Appendix M) (negative quantity)		0	(334)
10b. Fuel costs – Community heati	ng scheme			_
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0.0	01 = 41.56	(340a)
Water heating from CHP	(310a) x	4.24 × 0.0	01 = 84.42	(342a)
		Fuel Price		_
Pumps and fans	(331)	13.19 × 0.0	20.44	(349)
Energy for lighting	(332)	13.19 × 0.0	01 = 31.23	(350)
Additional standing charges (Table	12)		120	(351)
Energy saving/generation technolog Total energy cost	jies = (340a)(342e) + (345)(354) =		300.64	(355)
11b. SAP rating - Community heati	ng scheme			
Energy cost deflator (Table 12)			0.42	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =		1.31	(357)
SAP rating (section12)			81.69	(358)
12b. CO2 Emissions – Community h		Emission for	ter Emissions	
		ergy Emission fac Vh/year kg CO2/kWh	tor Emissions kg CO2/year	
CO2 from other sources of space ar Efficiency of heat source 1 (%)		ls repeat (363) to (366) for the secor	nd fuel 94	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x	100 ÷ (367b) x 0.22	= 682.71	(367)
Electrical energy for heat distribution	ר [(313) x	0.52	= 15.42	(372)
Total CO2 associated with commun	ity systems (363)(366) + (368)(372)	= 698.13	(373)
CO2 associated with space heating	(secondary) (309) x	0	= 0	(374)
CO2 associated with water from imr	nersion heater or instantaneous he	eater (312) x 0.22	= 0	(375)
Total CO2 associated with space an	id water heating (373) + (374) + (375) =	698.13	(376)
CO2 associated with electricity for p	umps and fans within dwelling (33	1)) x 0.52	= 92.22	(378)
CO2 associated with electricity for li	ghting (332))) x	0.52	= 122.89	(379)
Energy saving/generation technolog Item 1	ies (333) to (334) as applicable	0.52 × 0.0	01 = -269.21	(380)
Total CO2, kg/year	sum of (376)(382) =		644.03	(383)

Dwelling CO2 Emission Rate (383) ÷ (4) =				12.57	(384)
El rating (section 14)				91.03	(385)
13b. Primary Energy – Community heating scheme					
	Energy kWh/year	Primary factor		Energy Vh/year	
Energy from other sources of space and water heating (Efficiency of heat source 1 (%)	not CHP) CHP using two fuels repeat (363) to	(366) for the second	fuel	94	(367a)
Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	=	3856.06	(367)
Electrical energy for heat distribution	[(313) x		=	91.21	(372)
Total Energy associated with community systems	(363)(366) + (368)(372	2)	=	3947.27	(373)
if it is negative set (373) to zero (unless specified othe	erwise, see C7 in Appendix C	;)		3947.27	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or	instantaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			3947.27	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans w	ithin dwelling (331)) x	3.07	=	545.49	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	726.9	(379)
Energy saving/generation technologies Item 1		3.07 × 0.01	=	-1592.44	(380)
Total Primary Energy, kWh/year sum	of (376)(382) =			3627.22	(383)

			User D	etails:						
Assessor Name: Software Name:	Zahid Ashra Stroma FSA			Stroma Softwa					001082 on: 1.0.5.9	
Software Name.	Stroma i SA			Address:		51011.		Versic	n. 1.0.3.3	
Address :			roporty /	1001000.						
1. Overall dwelling dimen	sions:									
Ground floor				a(m²) 1.22	(1a) x		ight(m) 2.5	(2a) =	Volume(m ³) 128.04) (3a)
Total floor area TFA = (1a))+(1b)+(1c)+(1	d)+(1e)+(1n	u) 5	1.22	(4)			J		
Dwelling volume		-, (, (1.22		+(3c)+(3c	l)+(3e)+	.(3n) =	128.04	(5)
2. Ventilation rate:										_
Number of chimneys	main heating	secondar heating + 0	у] + [_	other 0] = [total 0	X 4	40 =	m ³ per hour	(6a)
Number of open flues	0	+ 0] + [0] = [0	x :	20 =	0	(6b)
Number of intermittent fan	s	· · · · · · · · · · · · · · · · · · ·			- E	2	x	10 =	20	(7a)
Number of passive vents						0	x ·	10 =	0	(7b)
Number of flueless gas fire	es					0	x 4	40 =	0	 (7c)
5					L	•				
								Air ch	anges per ho	ur
Infiltration due to chimneys					ontinue fro	20 om (9) to (÷ (5) =	0.16	(8)
Number of storeys in the	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.2 if both types of wall are pre deducting areas of opening	sent, use the valu	e corresponding to				uction			0	(11)
If suspended wooden flo	oor, enter 0.2 (unsealed) or 0.	1 (seale	d), else	enter 0				0	(12)
If no draught lobby, ente	er 0.05, else er	nter 0							0	(13)
Percentage of windows	and doors dra	ught stripped							0	(14)
Window infiltration				0.25 - [0.2			(45)		0	(15)
Infiltration rate Air permeability value, q	50 overessed	lin cubic motro		(8) + (10) ·				aroa	0	(16)
If based on air permeabilit	•		•	•	•		invelope	alea	5 0.41	(17) (18)
Air permeability value applies						is being u	sed		0.41	
Number of sides sheltered									2	(19)
Shelter factor				(20) = 1 - [0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporatin	ng shelter facto	or		(21) = (18)	x (20) =				0.35	(21)
Infiltration rate modified for	<u> </u>	speed					1	1	1	
Jan Feb M	/lar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe							i	1	1	
(22)m= 5.1 5 4	.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor $(22a)m = (22)$				I			1		I	
(22a)m= 1.27 1.25 1.	23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m	-	-		-	
.	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se						0	(23a)
				endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)), othei	rwise (23b) = (23a)			0	(23b)
If bal	anced with	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =	, , ,			0	(23c)
			-	-	-			HR) (24a		2b)m + ()	23b) x [[,]	1 – (23c)	-	(200)
(24a)m=	r	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If	balance	ed mecha	ı anical ve	ntilation	without	heat rec	ı coverv (l	u MV) (24b	m = (22)	1 2b)m + (;	23b)		1	
, (24b)m=		0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	iouse ex	tract ver	tilation of	or positiv	ve input v	ventilatio	on from c	outside				1	
,	if (22b)r	n < 0.5 ×	(23b), t	hen (24	c) = (23b); otherv	wise (24	c) = (22b	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,						•		on from I						
	r ,	I	r í j	· · · ·	<i>.</i>	· · ·	<u> </u>	0.5 + [(2	, 	-			1	
(24d)m=		0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58		(24d)
	r	· · · ·	·	· · ·		r i	<u>, ,</u>	d) in boy	r <u>, í</u>	0.57	0.50	0.50	1	(25)
(25)m=	0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58		(25)
3. He	at losse	s and he	eat loss	paramete	er:									
ELEN	MENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/ł	<)	k-value kJ/m²∙l		A X k kJ/K
Doors						2	x	1	=	2				(26)
Windo	ws Type	e 1				7.06	x1	/[1/(1.4)+	0.04] =	9.36				(27)
Windo	ws Type	e 2				3.74	x1	/[1/(1.4)+	0.04] =	4.96				(27)
Floor 7	Type 1					2.292	<u>2</u> x	0.13	=	0.29796	3			(28)
Floor 7	Type 2					48.92	3 X	0.13		6.35999			\exists	(28)
Walls [•]	Type1	41.9)4	10.8	;	31.14	t X	0.18		5.6	ז ד		\exists	(29)
Walls	Type2	5.6	2	2		3.62	×	0.18	=	0.65	ז ד		\exists	(29)
Total a	area of e	elements	, m²			98.77	7							(31)
		l roof wind as on both					ated using	g formula 1,	/[(1/U-valı	ıe)+0.04] a	ns given in	paragraph	3.2	
		ss, W/K :						(26)(30)	+ (32) =				29.23	(33)
		Cm = S(,					((28)	(30) + (32	2) + (32a).	(32e) =	6039.99	
Therm	al mass	parame	ter (TMI	- = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value:	: Medium		250	(35)
	•	sments wh ad of a de			construct	ion are not	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f	L	
Therm	al bridg	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						7.63	(36)
if details	s of therma	al bridging	are not kr	own (36) =	= 0.05 x (3	1)								
Total f	abric he	at loss							(33) +	(36) =			36.86	(37)
Ventila	ation hea	at loss ca	r	monthl				1	· · ·	= 0.33 × (25)m x (5)	1	1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	25.22	25.06	24.91	24.17	24.04	23.4	23.4	23.28	23.64	24.04	24.31	24.6		(38)
Heat t	r	coefficie	nt, W/K			,		I	(39)m	= (37) + (3	38)m		1	
(39)m=	62.08	61.92	61.77	61.04	60.9	60.26	60.26	60.14	60.51	60.9	61.18	61.47		
										Average =	Sum(39)1	12 /12=	61.04	(39)

Heat l	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.21	1.21	1.21	1.19	1.19	1.18	1.18	1.17	1.18	1.19	1.19	1.2		
Numh	er of day	/s in mo	nth (Tab	le 1a)				Į	,	Average =	Sum(40)1.	12 /12=	1.19	(40)
Turno	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 requ	irement:								kWh/ye	ear:	
if TF				: [1 - exp	(-0.0003	349 x (TF	-A -13.9)2)] + 0.0)013 x (TFA -13.		73		(42)
Reduce	the annua	al average	hot water	usage by	5% if the c		designed	(25 x N) to achieve		se target o		.19		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	: (43)					I	
(44)m=	82.71	79.7	76.69	73.69	70.68	67.67	67.67	70.68	73.69	76.69	79.7	82.71		
Energy	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x [OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		902.29	(44)
(45)m=	122.66	107.28	110.7	96.51	92.6	79.91	74.05	84.97	85.99	100.21	109.39	118.79		
lf instar	ntaneous w	vater heati	na at poini	t of use (no	hot wate	r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1183.04	(45)
(46)m=	18.4	16.09	16.6	14.48	13.89	11.99	11.11	12.75	12.9	15.03	16.41	17.82		(46)
· · ·	storage		10.0	14.40	10.00	11.55		12.70	12.5	10.00	10.41	17.02		(10)
Storag	ge volum	e (litres)	includir	ng any s	olar or V	WHRS	storage	within sa	ame ves	sel		150		(47)
	•	•			•	enter 110		```						
			hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage nanufact		eclared I	oss fact	or is kno	wn (kWł	n/dav):				1	39		(48)
		actor fro				(" aay ji					54		(49)
•		m water			ear			(48) x (49)) =			75		(50)
b) If n	nanufact	urer's de	eclared	cylinder	loss fact	or is not								
		-			le 2 (kW	h/litre/da	ay)					0		(51)
	•	eating s from Ta		011 4.5								0		(52)
		actor fro		2b								0		(53)
Energ	y lost fro	m water	storage	, kWh/y	ear			(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 cylind	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	50), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
Prima	ry circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
	•						• •	65 × (41)		- 11.	- (- ()			
		· · · · · ·	· · · · · ·		r		r	ng and a	-	1	· · ·	22.22	l	(59)
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(39)

Combi	loss ca	lculated	for eac	ch i	month ((61)m =	(60	D) ÷ 36	65 × (41))m									
(61)m=	0	0	0		0	0		0	0	0		0	0		0	C)		(61)
Total h	eat req	uired for	water	he	ating ca	alculated	d fo	or eacl	h month	(62)n	า =	0.85 × ((45)m -	+ (4	16)m +	(57)	m +	(59)m + (61)m	
(62)m=	169.25	149.36	157.29)	141.6	139.2		125	120.64	131.5	57	131.08	146.8	3	154.48	165	.38		(62)
Solar DH	IW input	calculated	using A	ppe	ndix G or	Appendix	ίΗ	(negati	ve quantity	/) (ente	r '0'	if no sola	r contrib	outio	n to wate	er hea	ting)		
(add a	dditiona	l lines if	FGHR	Sa	and/or V	WWHRS	S ap	oplies	, see Ap	pendi	хG	G)							
(63)m=	0	0	0	Τ	0	0		0	0	0		0	0		0	C)		(63)
Output	from w	ater hea	ter													•			
(64)m=	169.25	149.36	157.29	9	141.6	139.2		125	120.64	131.5	57	131.08	146.8	3	154.48	165	.38		
		1		-							Dutp	ut from wa	ater hea	ater (annual)1	12		1731.66	(64)
Heat a	ains fro	m water	heatin	a. I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61	l)m	1 + 0.8 x	(46)r	m +	(57)m	+ (5	9)m	1	-
(65)m=	78.06	69.34	74.08	-	68.16	68.07	-	62.64	61.9	65.5	<u> </u>	64.66	70.6	-	72.44	76.			(65)
		n in calo											lis	fro	m com			l	
	. ,				. ,	-	, y m				ig (man	ity i	leating	
		ains (see).													
Metabo		ns (Table				Mari	<u> </u>	l	l. I	A		0			Navi				
(00)	Jan	Feb	Mai	+	Apr	May	-	Jun	Jul	Au	<u> </u>	Sep	Oct		Nov		ec		(66)
(66)m=	86.3	86.3	86.3		86.3	86.3		86.3	86.3	86.3		86.3	86.3		86.3	86	.3		(66)
-		(calcula		App		· ·	-		, 	1	- 1								
(67)m=	13.44	11.94	9.71		7.35	5.49	·	4.64	5.01	6.51		8.74	11.1		12.96	13.	81		(67)
Applia	nces ga	ins (calc	ulated	in	Append	dix L, eq	uat	tion L	13 or L1	3a), a	lso	see Ta	ble 5						
(68)m=	150.39	151.95	148.02	2	139.64	129.08	1	19.14	112.51	110.9	95	114.88	123.2	5	133.82	143	.75		(68)
Cookin	ig gains	(calcula	ated in	Ap	pendix	L, equa	tior	n L15	or L15a)), alsc	se	e Table	5						
(69)m=	31.63	31.63	31.63	Τ	31.63	31.63	3	31.63	31.63	31.6	3	31.63	31.63	3	31.63	31.	63		(69)
Pumps	and fa	ns gains	(Table	e 5a	a)														
(70)m=	3	3	3		3	3		3	3	3		3	3		3	3	3		(70)
Losses	s e.q. e\	/aporatic	n (neg	ati	ve valu	es) (Tab	ble	5)								!			
(71)m=		-69.04	-69.04	-	-69.04	-69.04	1	, 69.04	-69.04	-69.0)4	-69.04	-69.04	4	-69.04	-69	.04		(71)
		ı gains (T	I Table 5)			I												
(72)m=	104.92	103.18	99.57	<u>́</u>	94.67	91.49	Γ	87	83.19	88.0	8	89.81	94.89	9	100.62	103	.19		(72)
		gains =							m + (67)m								-		
(73)m=	320.64	318.96	309.19		293.55	277.95	2	62.68	252.6	257.4		265.32	281.1		299.28	312	64	l	(73)
· · /	ar gain	1	000.10	<u></u>	200.00	211.55	<u> </u>	02.00	202.0	201	¹⁰	200.02	201.13	<u> </u>	255.20	012	.04		()
		calculated	usina sa	lar	flux from	Table 6a	and	lassoci	iated equa	tions to		nvert to th	e applic	able	orientat	tion			
•		Access F	•		Area			Flu				g_	ie applie		FF			Gains	
Onona		Table 6d			m²				ole 6a		Та	9_ able 6b		Tal	ole 6c			(W)	
Southe	astoov[0.77		x	3.7	1	x		6.79	∣ x [0.63	x		0.7	_	=	42.06	(77)
Southe	L			^ x				r						⊢		\dashv](77)
Southe	Ŀ	0.77			3.7		x		2.67	X V [0.63			0.7	=	=	71.64]
	L	0.77		X	3.7		x		5.75			0.63	×	F	0.7	=	=	98.01	(77)
Southe	L	0.77		x	3.7		x		06.25			0.63	×		0.7	\dashv	=	121.44	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.7	'4	x	1	19.01	x		0.63	×		0.7		=	136.03	(77)

Southeas	st 0.9x	0.77	x	3.7	74	x	1	18.15	x	0.6	63	x	0.7		=	13	5.04	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	1	13.91	x	0.6	63	x	0.7] =	13	0.2	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	10	04.39	x	0.6	63	×	0.7] =	119	9.32	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	9	2.85	x	0.6	63	x	0.7] = [100	6.13	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	6	9.27	x	0.6	63	x	0.7] =	79	.17	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	4	4.07	x	0.6	63	×	0.7] =	50	.37	(77)
Southeas	st 0.9x	0.77	x	3.7	74	x	3	31.49	x	0.6	63	x	0.7] = [35	.99	(77)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	3	6.79	1	0.6	63	x	0.7] = [79	.39	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0	06	x	6	2.67	1	0.6	63	×	0.7] = [13	5.23	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	8	5.75	Ī	0.6	63] × [0.7] =]	18	5.02	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0	06	x	10	06.25	i	0.6	63] × [0.7] =	229	9.25	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0	06	x	1	19.01	i	0.6	63] × [0.7] =	25	6.78	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	1	18.15	i	0.6	63	İ x İ	0.7] = [254	4.92	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	1	13.91	i	0.6	63	i x i	0.7] =	24	5.77	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	1	04.39	ĺ	0.6	63	×	0.7] =]	22	5.24	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	9	2.85	i	0.6	63	i × i	0.7		i = 1	200	0.34	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	6	9.27	i	0.6	63	i x i	0.7] =	149	9.45	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	4	4.07	ĺ	0.6	63	×	0.7] =]	95	.09	(79)
Southwe	st <mark>0.9x</mark>	0.77	x	7.0)6	x	3	31.49	i	0.6	63	i × i	0.7		i = 1	67	.94	(79)
	L								1						-			-4
Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$																		
Solar da	ains in v	watts. ca	lculated	for eac	h montl	h			(83)m	= Sum(7	74)m	(82)m						
Ť	ains in 121.44	watts, ca 206.86	lculated 283.04	for eac 350.7	h mont 392.81		89.97	375.97	<mark>(83)</mark> m 344		-	<mark>(82)m</mark> 228.63	145.4	6 10)3.93			(83)
(83)m=	121.44		283.04	350.7	392.81	3			1		-		145.4	6 10)3.93			(83)
(83)m= Total ga	121.44	206.86	283.04	350.7	392.81	3			1	.55 30	6.47				03.93			(83) (84)
(83)m= [Total ga (84)m= [121.44 ains — ir 442.08	206.86 nternal ar	283.04 nd solar 592.22	350.7 (84)m = 644.25	392.81 = (73)m 670.76	3 + (6	83)m	, watts	344	.55 30	6.47	228.63						
(83)m= Total ga (84)m= 7. Mea	121.44 ains — ir 442.08 an inter	206.86 nternal ar 525.82	283.04 nd solar 592.22 erature	350.7 (84)m = 644.25 (heating	392.81 = (73)m 670.76 seaso	3 + (i 6 n)	83)m 52.64	, watts 628.58	344 601	.55 30 .98 57	6.47	228.63					21	
(83)m= Total ga (84)m= 7. Mea Tempe	121.44 ains — ir 442.08 an inter erature	206.86 nternal ar 525.82 nal tempe	283.04 nd solar 592.22 erature eating p	350.7 (84)m = 644.25 (heating eriods ir	392.81 = (73)m 670.76 seaso n the liv	3 + (i 6 n)	83)m 52.64 area 1	, watts 628.58 from Tab	344 601	.55 30 .98 57	6.47	228.63				2	21	(84)
(83)m= Total ga (84)m= 7. Mea Tempe	121.44 ains — ir 442.08 an inter erature	206.86 nternal ar 525.82 nal tempo during he	283.04 nd solar 592.22 erature eating p	350.7 (84)m = 644.25 (heating eriods ir	392.81 = (73)m 670.76 seaso n the liv	3 + (i 6 n) ing n (s	83)m 52.64 area 1	, watts 628.58 from Tab	344 601 ble 9	.55 30 .98 57 Th1 (°	6.47	228.63	3 444.7	4 41		2	21	(84)
(83)m= Total ga (84)m= 7. Mea Tempe	121.44 ains — ir 442.08 an inter erature tion fac	206.86 nternal ar 525.82 nal tempo during he tor for ga	283.04 nd solar 592.22 erature eating p	350.7 (84)m = 644.25 (heating eriods ir iving are	392.81 = (73)m 670.76 I seaso n the liv ea, h1,r	3 + (6 n) ring n (s	83)m 52.64 area 1 see Ta	, watts 628.58 from Tat ble 9a)	344 601 ble 9	55 30 98 57 Th1 (° Jg 5	6.47 1.79 C)	228.63 509.76	3 444.7	4 41	16.57	2	21	(84)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m=	121.44 ains – ir 442.08 an interr erature tion fac Jan 0.99	206.86 Internal ar 525.82 Inal tempe during he tor for ga Feb 0.98	283.04 nd solar 592.22 erature eating p tins for l Mar 0.95	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75	3 + (6 n) ring n (s	83)m 52.64 area f ee Ta Jun 0.57	, watts 628.58 from Tab ble 9a) Jul 0.42	344 601 ble 9 A	55 30 98 57 Th1 (° ug <u>\$</u> 5 0	6.47 1.79 C) Sep .68	228.63 509.76 Oct	5 444.7 No	4 41	16.57 Dec	2	21	(84)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m=	121.44 ains – ir 442.08 an interr erature tion fac Jan 0.99	206.86 Internal ar 525.82 Inal tempo during he tor for ga Feb	283.04 nd solar 592.22 erature eating p tins for l Mar 0.95	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75	3 + (i 6 n) ing m (s follc	83)m 52.64 area f ee Ta Jun 0.57	, watts 628.58 from Tab ble 9a) Jul 0.42	344 601 ble 9 A	55 30 98 57 Th1 (° 19 5 0 5 0	6.47 1.79 C) Sep .68	228.63 509.76 Oct	5 444.7 No	4 41 / 1	16.57 Dec	2	21	(84)
(83)m= [Total ga (84)m= [7. Mea Tempe Utilisat (86)m= [Mean i (87)m= [121.44 ains – ir 442.08 an intern erature tion fac Jan 0.99 internal 19.91	206.86 Internal ar 525.82 during he tor for ga Feb 0.98 I tempera 20.12	283.04 nd solar 592.22 erature eating p tins for l Mar 0.95 ature in 20.4	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89	3 + (i 6 n) ing m (s follc	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21	344 601 0le 9 0.4 7 in T 20.	55 30 98 57 Th1 (° ug \$ 5 0 able 90 99 20	6.47 1.79 C) Sep .68 C) 0.95	228.63 509.76 Oct 0.91	 444.7 Nov 0.98 	4 41 / 1	16.57 Dec).99	2	21	(84)](85) (86)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= Tempe	121.44 ains – ir 442.08 in inter erature tion fac Jan 0.99 internal 19.91 erature	206.86 Internal ar 525.82 during he tor for ga Feb 0.98 I tempera 20.12 during he	283.04 nd solar 592.22 erature eating p ins for l Mar 0.95 ature in 20.4 eating p	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69 eriods ir	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o	3 + ((6 n) ing n (s follc 2 f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta	344 601 ble 9, Ai 0.4 7 in T 20. able \$	55 30 98 57 Th1 (° ug <u>\$</u> 5 0 able 9c 99 20 9, Th2 (6.47 1.79 C) Sep .68 .0.95 °C)	228.63 509.76 Oct 0.91 20.69	i 444.7 Nov 0.98 20.25	4 41 / 1 ; 1	Dec 0.99 9.88	2	21	(84) (85) (86) (87)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= Tempe (88)m=	121.44 ains – ir 442.08 in interner erature tion fac Jan 0.99 internal 19.91 erature 19.91	206.86 Internal ar 525.82 during he tor for ga Feb 0.98 I tempera 20.12 during he 19.91	283.04 nd solar 592.22 erature eating p ins for l Mar 0.95 ature in 20.4 eating p 19.92	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69 eriods ir 19.93	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o 19.93	3 + (i 6 n) ing m (s follc 2 f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94	344 601 ble 9, Ai 0.4 7 in T 20. able 9 19.	55 30 98 57 Th1 (° ug <u>\$</u> 5 0 able 9c 99 20 9, Th2 (6.47 1.79 C) Sep .68 C) 0.95	228.63 509.76 Oct 0.91	 444.7 Nov 0.98 	4 41 / 1 ; 1	16.57 Dec).99	2	21	(84)](85) (86)
(83)m= [Total ga (84)m= [7. Mea Tempe Utilisat (86)m= [Mean i (87)m= [Tempe (88)m= [Utilisat	121.44 ains – ir 442.08 an interner an interner an interner bin interner Jan 0.99 internal 19.91 erature 19.91 tion fac 19.91	206.86 Internal ar 525.82 nal tempor during he tor for ga 0.98 I tempera 20.12 during he 19.91 tor for ga	283.04 nd solar 592.22 erature eating p ains for l Mar 0.95 ature in 20.4 eating p 19.92 ains for l	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69 eriods ir 19.93	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o 19.93 welling.	3 + (i 6 n) ing n (s follo 2 f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table	344 601 ble 9 A 0.4 7 in T 20. 7 in T 20. 9a)	55 30 98 57 Th1 (° 10 ug 5 5 0 able 90 20 99 20 90, Th2 (19	6.47 1.79 C) Sep .68 c) 0.95 0.95 0.93	228.63 509.76 0.91 20.69 19.93	 444.7 Nov 0.98 20.25 19.92 	4 41 / 1 ; 1 ; 1	0.99 9.88 9.92	2	21	 (84) (85) (86) (87) (88)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= (87)m= (88)m= Utilisat (89)m=	121.44 ains – ir 442.08 an interner an interner bin interner bin interner Jan 0.99 internal 19.91 erature 19.91 tion fac 0.99	206.86 Internal ar 525.82 during he tor for ga 0.98 I tempera 20.12 during he 19.91 tor for ga 0.97	283.04 nd solar 592.22 erature eating p ains for l Mar 0.95 ature in 20.4 eating p 19.92 ains for l	350.7 (84)m = 644.25 (heating eriods ir iving are 0.88 living are 20.69 eriods ir 19.93 rest of d 0.85	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o 19.93 welling. 0.69	3 + (i 6 n) ring follc follc f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se 0.49	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table 0.32	344 601 ble 9, 0.4 7 in T 20. 19. 9a) 0.3	.55 30 .98 57 Th1 (°	6.47 1.79 C) Sep .68 C) 0.95 C) 0.95 C) 0.93 C) 0.93	228.63 509.76 0.91 20.69 19.93 0.87	i 444.7 Nov 0.98 20.25	4 41 / 1 ; 1 ; 1	Dec 0.99 9.88	2	21	(84) (85) (86) (87)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= (88)m= Utilisat (89)m=	121.44ains – ir442.08in interrestureeraturetion fac0.99internal19.91erature19.91tion fac0.99internalinternal	206.86Internal ar525.82Itempedduring hetor for gaFeb0.98Itempera20.12during he19.91tor for ga0.97Itempera	283.04 nd solar 592.22 erature eating p ins for l Mar 0.95 ature in 20.4 eating p 19.92 ins for l 0.93 ature in	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69 eriods ir 19.93 rest of d 0.85 the rest	392.81 = (73)m 670.76 seaso h the liv ea, h1,r May 0.75 ea T1 (20.89 h rest o 19.93 welling. 0.69 of dwel	3 + (i 6 n) ing m (s follc f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se 0.49	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table 0.32 ollow ste	344 601 601 A 0.4 7 in T 20. 3 able § 19. 9a) 0.2 eps 3	55 30 98 57 Th1 (° 10 ug 5 5 0 cable 9c 90 99 20 90, Th2 (94 19 5 0 to 7 in	6.47 1.79 C) Sep .68 .0.95 .0.95 .0.95 .0.93 .59 Table	228.63 509.76 0.91 20.69 19.93 0.87 9c)	 444.7 Nov 0.98 20.25 19.92 0.97 	4 41 / 1 5 11 2 11	0.99 0.99 0.99	2	21	 (84) (85) (86) (87) (88) (89)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= (87)m= (88)m= Utilisat (89)m=	121.44 ains – ir 442.08 an interner an interner bin interner bin interner Jan 0.99 internal 19.91 erature 19.91 tion fac 0.99	206.86 Internal ar 525.82 during he tor for ga 0.98 I tempera 20.12 during he 19.91 tor for ga 0.97	283.04 nd solar 592.22 erature eating p ains for l Mar 0.95 ature in 20.4 eating p 19.92 ains for l	350.7 (84)m = 644.25 (heating eriods ir iving are 0.88 living are 20.69 eriods ir 19.93 rest of d 0.85	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o 19.93 welling. 0.69	3 + (i 6 n) ing m (s follc f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se 0.49	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table 0.32	344 601 ble 9, 0.4 7 in T 20. 19. 9a) 0.3	55 30 98 57 Th1 (° 10 ug 5 5 0 cable 9c 90 99 20 90, Th2 (94 19 5 0 to 7 in	6.47 1.79 C) Sep .68 C) 0.95 0.95 0.93 .59 Table 9.9	228.63 509.76 0.91 20.69 19.93 0.87 9c) 19.6	 444.7 Nov 0.98 20.25 19.92 0.97 18.99 	4 41 / 1 5 11 2 11 C	16.57 Dec).99 9.88 9.92).99 8.45			 (84) (85) (86) (87) (88) (89) (90)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= (88)m= Utilisat (89)m=	121.44ains – ir442.08in interrestureeraturetion fac0.99internal19.91erature19.91tion fac0.99internalinternal	206.86Internal ar525.82Itempedduring hetor for gaFeb0.98Itempera20.12during he19.91tor for ga0.97Itempera	283.04 nd solar 592.22 erature eating p ins for l Mar 0.95 ature in 20.4 eating p 19.92 ins for l 0.93 ature in	350.7 (84)m = 644.25 (heating eriods ir iving are Apr 0.88 living are 20.69 eriods ir 19.93 rest of d 0.85 the rest	392.81 = (73)m 670.76 seaso h the liv ea, h1,r May 0.75 ea T1 (20.89 h rest o 19.93 welling. 0.69 of dwel	3 + (i 6 n) ing m (s follc f dw	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se 0.49	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table 0.32 ollow ste	344 601 601 A 0.4 7 in T 20. 3 able § 19. 9a) 0.2 eps 3	55 30 98 57 Th1 (° 10 ug 5 5 0 cable 9c 90 99 20 90, Th2 (94 19 5 0 to 7 in	6.47 1.79 C) Sep .68 C) 0.95 0.95 0.93 .59 Table 9.9	228.63 509.76 0.91 20.69 19.93 0.87 9c) 19.6	 444.7 Nov 0.98 20.25 19.92 0.97 	4 41 / 1 5 11 2 11 C	16.57 Dec).99 9.88 9.92).99 8.45		21	 (84) (85) (86) (87) (88) (89)
(83)m= Total ga (84)m= 7. Mea Tempe Utilisat (86)m= Mean i (87)m= (88)m= Utilisat (89)m= Utilisat (89)m= Mean i	121.44 ains – ir 442.08 in intern erature tion fac Jan 0.99 internal 19.91 tion fac 0.99 internal 19.91 tion fac 0.99	206.86Internal ar525.82Itempedduring hetor for gaFeb0.98Itempera20.12during he19.91tor for ga0.97Itempera	283.04 nd solar 592.22 erature eating p ains for l Mar 0.95 ature in 20.4 eating p 19.92 ains for l 0.93 ature in 19.18	350.7 (84)m = 644.25 (heating eriods ir iving are 0.88 living are 20.69 eriods ir 19.93 rest of d 0.85 the rest 19.59	392.81 = (73)m 670.76 seaso n the liv ea, h1,r May 0.75 ea T1 (20.89 n rest o 19.93 welling, 0.69 of dwel 19.83	3 + (i 6 n) ing n (s follc 2 f dw 1 1 follc 1 1	83)m 52.64 area f eee Ta Jun 0.57 ow ste 20.98 velling 19.94 ,m (se 0.49 19.93	, watts 628.58 from Tab ble 9a) Jul 0.42 ps 3 to 7 21 from Ta 19.94 ee Table 0.32 ollow ste 19.94	344 601 ble 9 A 0.4 7 in T 20. able § 19. 9a) 0.3 19.	55 30 98 57 Th1 (° ug 5 5 0 6able 9c 90 99 20 90 19 5 0 5 0 55 0 55 0 4 19 5 0 4 1	6.47 1.79 C) Sep .68 .0.95 .0.95 .0.95 .0.95 .0.93 .59 Table 9.9 fL	228.63 509.76 0.91 20.69 19.93 0.87 9c) 19.6	 444.7 Nov 0.98 20.25 19.92 0.97 18.99 	4 41 / 1 5 11 2 11 C	16.57 Dec).99 9.88 9.92).99 8.45			 (84) (85) (86) (87) (88) (89) (90)

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

(00)	10.40	10.00	10.70	00.00	00.0	00.4	00.44	00.44	00.07	00.00	40.55	40.00		(93)
(93)m=	19.13	19.39	19.73	20.08	20.3	20.4	20.41	20.41	20.37	20.09	19.55	19.09		(93)
			uirement		ra ahtair		on 11 of		h aa tha	tTim (76)m.on	d ro oolo	ulata	
			or gains						0, 50 tha		70)III ali	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	0.98	0.97	0.93	0.85	0.71	0.52	0.36	0.4	0.63	0.88	0.97	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m			r						
(95)m=	435.29	508.59	551.69	549.61	479.35	341.74	228.72	239.72	360.76	447.48	430.72	411.56		(95)
Month	nly avera	age exte	ernal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat			an intern	· · ·	i		- ,	x [(93)m	<u> </u>]				
(97)m=	920.83	897.52	817.03	682.53	524.04	349.36	229.74	241.3	379.37	577.8	761.7	915.06		(97)
Space	e heatin	· ·	ement fo	r each n	nonth, k	Wh/mont	h = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	361.24	261.36	197.41	95.7	33.25	0	0	0	0	96.96	238.3	374.61		_
								Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	1658.83	(98)
Space	e heatin	g require	ement in	kWh/m²	²/year								32.39	(99)
9a En	erav rea	wiremer	nts – Indi	ividual h	eating s	vstems i	ncluding	micro-C	CHP)			L. L. L. L. L. L. L. L. L. L. L. L. L. L		
	e heatir			i i i a a a a a a a a a a a a a a a a a	outing o	yotomor	lioraanig		, ,					
•		-	at from s	econdar	y/supple	mentary	system					I	0	(201)
Fraction of space heat from main system(s) (202) = 1 - (201) =											1	(202)		
												1	(204)	
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ Efficience of engine energy heating a start 1													-	
Efficiency of main space heating system 1											93.5	(206)		
Efficie	ency of s	seconda	ry/supple	ementar	y heatin	g system	1, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space			ement (c	i	d above)								
	361.24	261.36	197.41	95.7	33.25	0	0	0	0	96.96	238.3	374.61		
(211)m	n = {[(98)m x (20	04)] } x 1	00 ÷ (20)6)	-		-	-		-			(211)
	386.35	279.53	211.14	102.36	35.56	0	0	0	0	103.7	254.87	400.65		
								Tota	ll (kWh/yea	ar) =Sum(2	2 11) _{15,1012}	; =	1774.15	(211)
Space	e heatin	g fuel (s	econdar	y), kWh/	month							-		
= {[(98)m x (20)1)]}x1	00 ÷ (20	8)	-	-		-	-		-			
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
								Tota	ll (kWh/yea	ar) =Sum(2	215) _{15,1012}	Ē	0	(215)
Water	heating	I										-		
Output	from w	ater hea	ter (calc	ulated a	bove)									
	169.25	149.36	157.29	141.6	139.2	125	120.64	131.57	131.08	146.8	154.48	165.38		_
Efficier	ncy of w	ater hea	ater		-			-				_	79.8	(216)
(217)m=	86.79	86.29	85.42	83.8	81.66	79.8	79.8	79.8	79.8	83.74	85.97	86.93		(217)
		•	kWh/mo											
. ,) ÷ (217)											
(219)m=	195.02	173.09	184.14	168.98	170.46	156.64	151.18	164.87	164.26	175.31	179.69	190.25		
-	_							l ota	I = Sum(2)				2073.89	(219)
Annual totals kWh/year Space heating fuel used, main system 1										kWh/yea	r			
Space	neaung		su, main	System	I								1774.15	

Water heating fuel used				2073.89]
Electricity for pumps, fans and electric keep-hot					-
central heating pump:			30		(230c)
boiler with a fan-assisted flue	45		(230e)		
Total electricity for the above, kWh/year	sum of (230a)	(230g) =		75	(231)
Electricity for lighting				237.36	(232)
12a. CO2 emissions – Individual heating systems	including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh	tor	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216	=	383.22	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	447.96	(264)
Space and water heating	(261) + (262) + (263) + (264) =		[831.18	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	123.19	(268)
Total CO2, kg/year	sum (of (265)(271) =		993.29	(272)

TER =

(273)

19.39