			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201	2						Versio	n: 1.0.3.11	
		Pr	operty A	Address:	Arlingto	on 1 Bec	GND 5	1		
Address :										
1. Overall dwelling dime	nsions:									
	there Name: Stoma FSAP 2012 Software Version: Version: 1.0.3.11 Property Address: Artington 1 Bed GND 51 House Colspan="2">Volume(m) Area(m ²) AV. Height(m) Volume(m) (a) Volume(m) (a) <th <="" colspan="2" td=""></th>									
Ground floor			5	0.6	(1a) x	2	2.3	(2a) =	116.38	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e	e)+(1n) 5	0.6	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	116.38	(5)
2. Ventilation rate:										
			у	other		total			m ³ per hou	r
Number of chimneys		-] + [0] = [0	x	40 =	0	(6a)
Number of open flues		0	i + F	0	」 = [0	x	20 =	0	(6b)
Number of intermittent fa	ns				」 「	2	x	10 =	20	(7a)
Number of passive vents						0	x ·	10 =	0	(7b)
Number of flueless gas fi	sessor Name: Stoma FSAP 2012 Stoma Number: ftware Name: Stoma FSAP 2012 Carbon Stoma									
					L			Air ch	ange <mark>s per</mark> ho	
								÷ (5) =	0.17	(8)
		ed, proceed	l to (17), c	otherwise c	ontinue fr	om (9) to ((16)			
	ie dweiling (ns)						[(0)]	-11x0 1 -		
	25 for steel or timber	frame or	0.35 for	masonr	v constr	uction	[(0)	1,0.1 -		
if both types of wall are p	resent, use the value corres				•				0	
	- · · ·	led) or 0	مادمی 1	d) else	enter ()				0	7(12)
-			1 (30010	u), cise						_
		ripped								=
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =				=
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =			=
Air permeability value,	q50, expressed in cut	oic metres	s per ho	ur per so	quare m	etre of e	envelope	area	4	(17)
If based on air permeabil	ity value, then (18) = [(1	7) ÷ 20]+(8), otherwi	se (18) = (16)				0.37	(18)
		s been don	e or a deg	ree air per	meability	is being u	sed			_
Number of sides sheltere	d			(20) – 1 [0 075 v (1	0)1				
	ing chalter factor					9)] =				=
•	•	J		(21) = (10)	x (20) =				0.32	(21)
		i i	11	A	Con	Oat	Nev	Dee		
		Jun	Jui	Aug	Sep	Oct	NOV	Dec		
· · · · · · · · · · · · · · · · · · ·	<u>i i</u>		0.0	0.7	4	4.0	4.5	47		
(22)m= 5.1 5	4.9 4.4 4.3	3.8	J.Ö	3.1	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m			-		
	0.4	0.4	0.39	0.35	0.34	0.3	0.3	0.29	0.32	0.34	0.36	0.37		
		<i>ctive air</i> al ventila	•	rate for t	he appli	cable ca	se							
				endix N, (2	3h) - (23a	a) v Emv (e	auation (N	(5)) other	wise (23h) - (23a)			0	(23a)
				iency in %) = (20u)			0	(23b)
			•		Ũ		,	,		2h)m i (226) v [/	1 (220)	0	(23c)
a) II (24a)m=	r							1R) (24a	0 m = (22)	$\frac{20}{0}$ + m(d2	230) × [* 0	1 – (23c) 0	÷100]	(24a)
		÷	Ţ		÷	÷	÷	÷	Ŭ	, ,	ů	0		(210)
(24b)m=				entilation				0 0	0 = (22)	0	230)	0		(24b)
				tilation c	_			-	-	0	0	0		(210)
,				then (240	•	•				.5 x (23b))			
(24c)m=	r í	0	0	0	0	0	0	0	0	0	0	0		(24c)
		ı ventilatio	n or wh	ole hous	e positiv	/e input v	ı ventilatio	n from l	oft					
,				m = (22k	•					0.5]				
(24d)m=	0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (240	c) or (24	d) in box	(25)					
(25)m=	0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(25)
3 He	at losse	s and he	at loss i	paramete	ər:									
ELEN		Gros		Openin		Net Ar	ea	U-valu	Ie	AXU		k-value	2 A	A X k
		area		m		A ,r		W/m2		(W/I	K)	kJ/m ² ·ł		κJ/K
Doo <mark>rs</mark>						1.89	x	1.6	=	3.024				(26)
Windo	<mark>ws</mark> Type	e 1				4.41	x1,	/[1/(1.4)+	0.04] =	5.85				(27)
Windo	ws Type	2				4.41	x1/	/[1/(1.4)+	0.04] =	5.85	F			(27)
Windo	ws Type	e 3				1.08	x1,	/[1/(1.4)+	0.04] =	1.43				(27)
Floor						50.6	×	0.11		5.566	Ξ r			(28)
Walls		23.1	3	11.79	2	11.34		0.17		1.93	= 1		\dashv	(29)
	area of e	elements			<u> </u>	73.73			I		L			(31)
Party v			,			18.76		0		0	r			(32)
Party of								0		0	L		\dashv	
•	•	l roof wind	OWS USA	offective wi	ndow H-va	50.6		ı formula 1	/[(1/]_vəlu	<u>م) 10 مد</u>	l s aiven in	paragraph		(32b)
				nternal wall			atou uonig			io) i 0.04j c	lo givoir in	paragraph	10.2	
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				23.64	(33)
Heat c	apacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	7821.48	(34)
Therm	al mass	parame	ter (TMI	⁻ = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•	sments wh ad of a de		tails of the ulation.	construct	ion are not	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f		
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						4.57	(36)
			are not kr	nown (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			28.22	(37)
Ventila	ation hea	at loss ca	alculated	d monthly	/				(38)m	= 0.33 × (25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	22.32	22.2	22.08	21.52	21.42	20.93	20.93	20.84	21.12	21.42	21.63	21.85		(38)
Heat tr	ransfer o	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m=	50.54	50.42	50.3	49.74	49.64	49.15	49.15	49.06	49.34	49.64	49.85	50.07		
Stroma	FSAP 201	2 Version	1.0.3.11	(SAP 9.92)	- http://ww	ww.stroma	.com			Average =	Sum(39)1	12 /12=	49.7 ∌ aç	ge 2 o <mark>(39</mark>)

Heat Ic	oss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1	1	0.99	0.98	0.98	0.97	0.97	0.97	0.98	0.98	0.99	0.99		
Numbe	ar of day	vs in mo	nth (Tab	le 12)			•	•	,	Average =	Sum(40) ₁ .	12 /12=	0.98	(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)
4. Wa	iter hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		71		(42)
Reduce	the annua	al average	hot water	usage by		welling is	designed	(25 x N) to achieve		se target o		.76		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pe	r day for e		Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	82.24	79.25	76.25	73.26	70.27	67.28	67.28	70.27	73.26	76.25	79.25	82.24		
											m(44) ₁₁₂ =		897.12	(44)
Energy o	content of	hot water	used - ca	lculated m	onthly = 4.	190 x Vd,r	m x nm x D	0Tm / 3600) kWh/mor	oth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	121.95	106.66	110.06	95.96	92.07	79.45	73.62	84.48	85.49	99.63	108.76	118.11		_
lf instant	taneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1176.26	(45)
(46)m=	18.29	16	16.51	14.39	13.81	11.92	11.04	12.67	12.82	14.95	16.31	17.72		(46)
	storage		7											
-				-				within sa	ame ves	sel		0		(47)
	-	-			/elling, e						47)			
	nse i no storage		not wate	er (this ir	iciudes i	nstantar	ieous co	ombi boil	ers) ente	er u in (47)			
	-		eclared I	oss fact	or is kno	wn (kWł	n/day):					0		(48)
,			m Table			,	• •					0		(49)
Energy	/ lost fro	m wate	r storage	e, kWh/y	ear			(48) x (49)) =			0		(50)
b) If m	anufact	urer's d	eclared	cylinder	loss fact							-		
		•			le 2 (kW	h/litre/da	ay)					0		(51)
	•	from Ta	see secti	on 4.3								0	l	(52)
			m Table	2b								0		(52) (53)
•				e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
		(54) in (5	-	,	Jul			(,()	,(,(,		0		(55)
	. ,	. , .		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	prage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	i lix 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)
	•	•	,			59)m = ((58) ÷ 36	65 × (41)	m				-	
	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)

Combi	loss ca	lculated	for ea	ch	month (61)m =	(60)) ÷ 36	65 × (41))m									
(61)m=	23.7	21.39	23.6	5	22.85	23.59	2	2.81	23.55	23.	58	22.83	23.6	3	22.9	23.	.69		(61)
Total h	eat req	uired for	water	he	ating ca	alculated	d fo	r eacl	h month	(62)	m =	0.85 × ((45)m	+	(46)m +	(57)	m +	(59)m + (61)m	
(62)m=	145.65	128.05	133.7	'1	118.81	115.67	1	02.26	97.17	108	.06	108.33	123.2	26	131.66	141	.79		(62)
Solar DH	IW input	calculated	using A	hppe	ndix G or	Appendix	κΗ	(negati	ve quantity	/) (ent	er '0'	' if no sola	r contri	ibut	ion to wate	er hea	ating)		
(add ag	dditiona	al lines if	FGHF	RS a	and/or V	VWHRS	S ap	plies	, see Ap	penc	lix G	G)							
(63)m=	0	0	0		0	0		0	0	0		0	0		0	(C		(63)
Output	from w	ater hea	ter																
(64)m=	145.65	128.05	133.7	'1	118.81	115.67	1	02.26	97.17	108	.06	108.33	123.2	26	131.66	141	.79		
			-								Outp	out from w	ater he	ate	r (annual)₁	112		1454.42	(64)
Heat g	ains fro	m water	heatir	ng,	kWh/mo	onth 0.2	5 ′	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	k [(46))m	+ (57)m	+ (5	i9)m]	
(65)m=	46.47	40.81	42.5 ⁻	1	37.62	36.51	3	32.12	30.37	33.	99	34.13	39.0	94	41.89	45.	.19		(65)
inclu	de (57)	m in calo	culatio	n o	f (65)m	only if c	ylir	nder i	s in the c	dwell	ing	or hot w	ater i	s fr	om com	mun	ity h	eating	
5. Int	ernal g	ains (see	e Table	e 5	and 5a)):													
Metabo	olic gair	ns (Table	e 5), W	/att	S														
	Jan	Feb	Ma		Apr	May	Γ	Jun	Jul	A	ug	Sep	00	ct	Nov	D	ec		
(66)m=	85.39	85.39	85.39	9	85.39	85.39	8	35.39	85.39	85.3	39	85.39	8 <mark>5.3</mark>	9	85.39	85.	.39		(66)
Lightin	g gains	(calcula	ted in	Ap	pendix l	_, equat	tion	L9 o	r L9a), a	lso s	ee	Table 5							
(67)m=	13.39	11.89	9.67		7.32	5.47	4	4.62	4.99	6.4	.9	8.71	11.0	6	12.91	13.	.76		(67)
Appliar	nces ga	ins (calc	ulated	l in	Append	lix L, eo	uat	tion L	13 or L1	3a), a	also	see Ta	ble 5						
(68)m=		150.34	146.4	-	138 <mark>.16</mark>	, 127.71	<u> </u>	17.88	111.31	109		113.66	121.9	94	132.4	142	2.23		(68)
Cookin	a gains	s (calcula	ted in	Ap	pendix	L. equa	tior	ו L15	or L15a)), als	0 SE	e Table	5			Į			
(69)m=	31.54	31.54	31.54	- i	31.54	31.54	-	31.54	31.54	31.		31.54	31.5	64	31.54	31.	.54		(69)
Pumps	and fa	ns gains	(Tabl	e 5	a)		1								I				
(70)m=	3	3	3	T	3	3	Γ	3	3	3		3	3		3		3		(70)
Losses	e.a. ev	vaporatic	n (neo	nati	ve valu	es) (Tab	ble	5)							I	1			
(71)m=		- <u>-</u>	r È i	T	-68.31	-68.31	1	68.31	-68.31	-68.	31	-68.31	-68.3	31	-68.31	-68	.31		(71)
Water	heating	ı gains (T	r Table <i>(</i>	5)			I						I						
(72)m=	62.46	60.73	57.14	ŕ	52.25	49.08	4	4.61	40.82	45.	68	47.41	52.4	.7	58.18	60.	.74		(72)
Total i	nterna	l gains =	I				1	(66)	m + (67)m	L 1 + (68	3)m +	- (69)m + (l (70)m -	+ (7	1)m + (72))m			
(73)m=	276.26	· · · · · ·	264.8	7	249.35	233.87	2	18.73	208.74	213	.56	221.4	237.0	09	255.1	268	3.35		(73)
6. Sol	ar gain	s:														I			
Solar g	ains are	calculated	using s	olar	flux from	Table 6a	and	associ	iated equa	tions	to co	nvert to th	ne appli	icat	le orientat	tion.			
Orienta		Access F			Area			Flu				g_			FF			Gains	
	-	Table 6d			m²			Tal	ole 6a		Т	able 6b		Т	able 6c			(W)	
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	3	6.79	x		0.63	×		0.7		=	49.59	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	3	6.79	×		0.63	x		0.7		=	49.59	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	1.0	8	x	3	6.79	x		0.63	x	Γ	0.7		=	12.14	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	6	2.67	x		0.63	x	Ē	0.7		=	84.47	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	6	2.67	x		0.63	×	Γ	0.7		=	84.47	(77)

													_
Southeast 0.9x	0.77	X	1.08	×	6	62.67	x	0.63	X	0.7	=	20.69	(77)
Southeast 0.9x	0.77	x	4.41	x	8	35.75	x	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	х	4.41	x	8	35.75	x	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	x	1.08	x	8	35.75	x	0.63	x	0.7	=	28.3	(77)
Southeast 0.9x	0.77	x	4.41	x	1	06.25	x	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	x	4.41	x	1	06.25	x	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	x	1.08	x	1	06.25	x	0.63	x	0.7	=	35.07	(77)
Southeast 0.9x	0.77	x	4.41	x	1	19.01	x	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	x	4.41	x	1	19.01	x	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	x	1.08	x	1	19.01	x	0.63	x	0.7	=	39.28	(77)
Southeast 0.9x	0.77	x	4.41	x	1	18.15	x	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	x	4.41	x	1	18.15	x	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	x	1.08	x	1	18.15	x	0.63	x	0.7	=	39	(77)
Southeast 0.9x	0.77	x	4.41	x	1	13.91	x	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	x	4.41	x	1	13.91	x	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	x	1.08	x	1	13.91	x	0.63	x	0.7	=	37.6	(77)
Southeast 0.9x	0.77	x	4.41	x	1	04.39	x	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	4.41	X	1	04.39	x	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	1.08	x	1	04.39	x	0.63	x	0.7	=	34.46	(77)
Southeast 0.9x	0.77	x	4.41	x	Ę	92.85	x	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	4.41	x		92.85	x	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	1.08	×	Ģ	92.85	x	0.63	x	0.7	=	30.65	(77)
Southeast 0.9x	0.77	x	4.41	X	e	69.27	x	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	4.41	×	e	9.27	x	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	1.08	x	6	69.27	x	0.63	x	0.7	=	22.86	(77)
Southeast 0.9x	0.77	x	4.41	x	4	14.07	x	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	4.41	x	4	14.07	x	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	1.08	x	4	14.07	x	0.63	x	0.7	=	14.55	(77)
Southeast 0.9x	0.77	x	4.41	x	3	31.49	x	0.63	x	0.7	=	42.44	(77)
Southeast 0.9x	0.77	x	4.41	x	3	31.49	x	0.63	x	0.7	=	42.44	(77)
Southeast 0.9x	0.77	x	1.08	x	3	31.49	x	0.63	x	0.7	=	10.39	(77)
							-						
Solar gains in	watts, ca	lculated	i	nonth			(83)m	= Sum(74)m .				1	
(83)m= 111.32	189.62	259.45			357.47	344.64	315	.84 280.93	209.5	7 133.34	95.27		(83)
Total gains –	r r		· / ·	<u> </u>	. ,	· · · · · ·			r			1	
(84)m= 387.59	464.2	524.32	570.82 59	93.95	576.2	553.38	529	.4 502.33	446.66	388.44	363.62		(84)
7. Mean inte	rnal tempe	erature	(heating se	ason)									
Temperature	during he	eating p	eriods in th	e living	g area	from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fa	ctor for ga	ins for I	iving area,	h1,m (see Ta	able 9a)						1	
Jan	Feb	Mar	Apr	May	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.98	0.95	0.87 0).73	0.54	0.39	0.4	2 0.65	0.91	0.98	1		(86)
	_			- 4 / 4 11									
Mean interna	al tempera	ature in I	iving area	11 (foll	ow ste	ps 3 to 7	7 in T	able 9c)				-	
Mean interna (87)m= 20.12	20.32	20.56		<u> </u>	ow ste 20.99	21 21	7 in T 2'	1	20.79	20.41	20.08]	(87)

Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)						
(88)m=	20.08	20.09	20.09	20.1	20.1	20.11	20.11	20.11	20.1	20.1	20.1	20.09			(88)
Utilisa	ation fac	tor for g	ains for I	rest of d	welling,	h2,m (se	e Table	9a)							
(89)m=	0.99	0.98	0.94	0.84	0.67	0.47	0.31	0.34	0.58	0.87	0.98	0.99			(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (fo	ollow ste	eps 3 to 7	7 in Tabl	e 9c)					
(90)m=	18.93	19.21	19.55	19.88	20.05	20.1	20.11	20.11	20.09	19.87	19.34	18.88			(90)
									f	LA = Livin	g area ÷ (4	+) =	0.4	9	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA x T1	+ (1 – fL	A) x T2			L			-
(92)m=	19.52	19.76	20.05	20.34	20.49	20.54	20.55	20.55	20.53	20.32	19.87	19.47			(92)
Apply	adjustn	nent to t	he mean	internal	l temper	ature fro	m Table	4e, whe	ere appro	opriate					
(93)m=	19.52	19.76	20.05	20.34	20.49	20.54	20.55	20.55	20.53	20.32	19.87	19.47			(93)
8. Sp	ace hea	ting requ	uirement												
						ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m and	d re-calc	ulate		
the ut			or gains			lun	ll	A	Com	Ort	Nev	Dee			
L Itilie	Jan stion fac	Feb	Mar ains, hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(94)m=	0.99	0.97	0.94	0.85	0.7	0.5	0.35	0.38	0.61	0.88	0.98	0.99			(94)
			, W = (94			0.0	0.00	0.00	0.01	0.00	0.00	0.00			
(95)m=	383.5	451.85	491.08	484.89	413.62	289.14	193.73	202.99	308.36	393.97	379.02	360.8			(95)
	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	los <mark>s rate</mark>	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]					
(97)m=	7 <mark>6</mark> 9.13	749.15	681.49	568.81	436.32	292.03	194.02	203.49	317.05	482.6	636.47	764.65			(97)
Spac	e heatin	g require	ement fo	<mark>r eac</mark> h n	nonth, kl	Nh/mont	th = 0.02	24 x [(97)) <mark>m – (9</mark> 5)m <mark>] x (4</mark> '	1)m				
(98)m=	286.91	199.79	141.67	60.42	16.89	0	0	0	0	65.94	185.36	300.47			_
								Tota	l per year	(kWh/year	[•]) = Sum(98	B) _{15,912} =	1257	.44	(98)
Space	e heatin	g require	ement in	kWh/m²	²/year								24.8	35	(99)
9a. En	ergy rec	uiremer	nts – Indi	vidual h	eating s	ystems i	ncluding	micro-C	CHP)						_
	e heatir														
Fract	ion of sp	ace hea	at from se	econdar	y/supple	mentary	system						0		(201)
Fract	ion of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1		(202)
Fract	ion of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1		(204)
Efficie	ency of I	main spa	ace heati	ing syste	em 1								92.	7	(206)
Efficie	ency of s	seconda	ry/supple	ementar	y heating	g system	ז, %						0		(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	k\	Wh/yea	⊐ ar
Space			ement (c		,		•••		000	•••		200		,	
•	286.91	199.79	141.67	60.42	16.89	0	0	0	0	65.94	185.36	300.47			
(211)m	n = {[(98)m x (20)4)] } x 1	00 ÷ (20)6)										(211)
(,	309.5	215.52	152.82	65.18	18.22	0	0	0	0	71.13	199.96	324.13			
			<u> </u>		ļ	<u> </u>		Tota	l (kWh/yea	ar) =Sum(2	2 11) _{15,1012} =	=	1356	.46	(211)
Space	e heatin	g fuel (s	econdar	y), kWh/	month							L			-
•			00 ÷ (20												
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0			
								Tota	l (kWh/yea	ar) =Sum(2	2 15) _{15,1012}	=	0		(215)

Water heating

Output from wa	tor boo	tor (calc	ulated al										
· · · · · · · · · · · · · · · · · · ·	128.05	133.71	118.81	115.67	102.26	97.17	108.06	108.33	123.26	131.66	141.79]	
Efficiency of wa	ater hea	ter										87	(216)
(217)m= 88.77	88.63	88.37	87.89	87.33	87	87	87	87	87.92	88.56	88.82		(217)
Fuel for water h	-											-	
(219)m = (64)n (219)m = 164.07	<u>n x 100</u> 144.48) ÷ (217) 151.31	m 135.18	132.44	117.54	111.69	124.21	124.51	140.19	148.67	159.65	1	
(219)11= 104.07	144.40	101.01	133.10	132.44	117.54	111.09		I = Sum(2		140.07	159.65	1653.95	(219)
Annual totals										Wh/year		kWh/year	
Space heating	fuel use	ed, main	system	1								1356.46	
Water heating f	uel use	d										1653.95	
Electricity for pu	umps, fa	ans and	electric	keep-ho	t								_
central heating	g pump:	:									30]	(230c)
boiler with a fa	an-assis	ted flue									45	j	(230e)
Total electricity	for the	above, ł	<wh td="" yea<=""><td>r</td><td></td><td></td><td>sum</td><td>of (230a).</td><td>(230g) =</td><td></td><td></td><td>75</td><td>(231)</td></wh>	r			sum	of (230a).	(230g) =			75	(231)
Electricity for lig	ghting											236.49	(232)
Electricity gene	rated by	y PVs										-555.31	(233)
12a. CO2 emi	ssions -	- Individ	ual h <mark>eat</mark> i	ng syste	ems inclu	uding mi	cro-CHP						
					En	ergy			Fmiss	ion fac	tor	Em <mark>issio</mark> ns	
						/h/year			kg CO			kg <mark>CO2/</mark> yea	
Spa <mark>ce he</mark> ating	(main s	ystem 1))		(211	I) x			0.2	16	=	293	(261)
Space heating	(second	dary)			(215	5) x			0.5	19	=	0	(263)
Water heating					(219	9) x			0.2	16	=	357.25	(264)
Space and wate	er heati	ng			(261	I) + (262) -	+ (263) + (264) =				650.25	(265)
Electricity for pu	umps, fa	ans and	electric	keep-ho	t (231	l) x			0.5	19	=	38.93	(267)
Electricity for lig	ghting				(232	2) x			0.5	19	=	122.74	(268)
Energy saving/	generat	ion tech	nologies										_
Item 1									0.5		=	-288.2	(269)
Total CO2, kg/y	/ear							sum o	f (265)(2	271) =		523.71	(272)
Dwelling CO2	Emissi	on Rate	ļ					(272)	÷ (4) =			10.35	(273)
EI rating (section	on 14)											93	(274)

			User D	etails:						
Assessor Name: Software Name:	essor Name: Torma FSAP 2012 Stroma Number: Stroma Number: Stroma FSAP 2012 Stroma Parent: Stroma Number: Stroma FSAP 2012 Stroma Parent: Parent Address: Atlington 1 Bed MID 3 $Torma FSAP 2012 Torma FSAP 20$									
		Pro	operty A	Address:	Arlingto	on 1 Bec	I MID 51			
Address :										
1. Overall dwelling dime	ensions:									
•	ftware Name: Stoma FSAP 2012 Software Version: Version: 1.0.3.11 Property Address: Artington 1 Bed MID 51 Contraction 1 Bed MID 51 Contraction 1 Bed MID 51 Area(m ²) Volume(m ²) (a) Volume(m ²) (a) Volume(m ²) (a) Volume(m ²) (a) Volume(m ²) Volume Volume(m ²) Volume (m ²) Volume(m ²) Volume (m ²) Volume(m ²) Volution rate: matrix secondary oth col Volume(m ²) Note of chimneys matrix secondary other of total m ³ per hour Note of chimneys flues and fans = secondary other of the secondary At to a O(a) Volume(m ²) Provide total Colspan= 2 Volume(m ²) at total other of total m ³ per hour <th< td=""></th<>									
Ground floor	so Name: Stom A EAP 2012 Stoma Number: Stoma FSAP 2012 Stoma C Persion: Version: 1.0.3.11 Property Address: Arington 1 Bed MDI 5 Transmission: A Stransmission: A Stransmiss									
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)) 5	0.6	(4)					
Dwelling volume	sessor Name: Stoma FSAP 2012 Stoma Number: Stoma: Version: Version: 1.0.3.11 Research Address: Coveral dwelling dimensions: Area(m ²) AV. Height(m) Volume(m ²) and floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) So.6 (a) (b) (c)									
2. Ventilation rate:								-		
			/	other		total			m ³ per hou	r
Number of chimneys		-] + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	」 +	0	」] = 厂	0	x 2	20 =	0	 (6b)
Number of intermittent fa	ins				」 L 「	2	x ^	10 =	20	(7a)
Number of passive vents	5					0	x /	10 =	0	 (7b)
Number of flueless gas fi	essor Name: Stroma FSAP 2012 Stroma Number: favor Name: Stroma FSAP 2012 Stroma Person: Version: 1.0.3.11 Protectly Address: Arlington 1 Bed MID 54 Terms : Overall dwelling dimensions: $Area(n^{-1}) (a) X + Height(n) (a) (a) (a) (a) (a) (a) (a) (a) (a) (a$									
sesses or Name: Strom FSAP 2012 Strom Aumber: Description Version: 1.0.3.11 Repeat Vaderass: Artington 1 Eed MID 51 Operatington 1 Eed MID 51 Noterall dwelling dimensions: Area(m ²) Av. Helph(m) Volume(m ²) output floor 1103.00 total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) So.0 (a) addit floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) So.0 (a) (b) (b) (c) (c)										
								÷ (5) =	0.17	(8)
		ed, proceed	to (17), o	otherwise c	ontinue fr	om (9) to ((16)			_
	he dwelling (ns)						(0)	41-0-4		
	25 for steel or timber	frame or (0 35 for	masonr	v constr	uction	[(9)	-1]XU.1 =		
					•	uction			0	
			. , .							_
		led) or 0.1	l (seale	d), else	enter 0					=
• ·		huim n a d								=
•	s and doors draught si	inpped		0 25 - [0 2	$x(14) \div 1$	001 -				=
						- 1	+ (15) =			
	a50 expressed in cut	nic metres						area		=
	• • •		•	•	•		intelepe	aiou		=
•	•					is being u	sed		0.01	
Number of sides sheltere	эd								2	(19)
Shelter factor				(20) = 1 - [0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporat	ting shelter factor			(21) = (18)	x (20) =				0.32	(21)
Infiltration rate modified f	or monthly wind speed	t t							l	
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor $(22a)m = (2)$	2)m ÷ 4									
		0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjust	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
	0.4	0.4	0.39	0.35	0.34	0.3	0.3	0.29	0.32	0.34	0.36	0.37		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se			-		-		(00-)
				endix N, (2	3h) - (23a	a) v Emv (e	austion (N	(5)) other	wise (23h) – (23a)			0	(23a)
				iency in %) – (200)			0	(23b)
			-	-	-					⊃h.)	00k) [1 (00-)	0	(23c)
		i	i	1		1	, ,		, ,	r , ,	<u> </u>	1 – (23c)	÷ 100]	(24a)
(24a)m=		0	0	0	0	0	0	0	0	0	0	0		(24a)
,		1	1	entilation			, , , , , , , , , , , , , , , , , , ,	, ` · · · · · · · · · · · · · · · · · ·	, <u>,</u>	r í	<u>, </u>			(0.45)
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
,				ntilation o	•	•				F (00k				
	, <i>,</i>	1	r ,	then (240	, ,	ŕ		r i	,	r È	<u> </u>		l	(24c)
(24c)m=		0	0	ů	0	0	0	0	0	0	0	0		(240)
,				ole hous $m = (22k)$		•				0 51				
(24d)m=	<u>, </u>	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t) or (24	c) or (24	d) in box	(25)					
(25)m=	0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(25)
· ·														
3. He	at losse	s and he	eat loss	paramete										
ELEN		Gros area		Openin m		Net Ar A ,n		U-valu W/m2		A X U (W/I		k-value		A X k kJ/K
Doors		area	(111)			1.89	x	1.6		,		K0/111-1	`	(26)
		.1								3.024	H			
	ws Type					4.41		/[1/(1.4)+		5.85				(27)
	ws Type					4.41		/[1/(1.4)+	4	5.85				(27)
Windo	ws Type	e 3				1.08	x1,	/[1/(1.4)+	0.04] =	1.43				(27)
Walls		23.1	3	11.79	9	11.34	X	0.17	=	1.93				(29)
Total a	rea of e	lements	, m²			23.13	3							(31)
Party v	vall					18.76	; x	0	=	0				(32)
Party f	loor					50.6					[$\neg \square$	(32a)
Party o	ceiling					50.6					[i –	(32b)
							ated using	formula 1,	/[(1/U-valu	ie)+0.04] a	s given in	paragraph	3.2	
		s on both s, W/K :		nternal walı	is and part	litions		(26)(30)	+ (32) -				10.00	(22)
		Cm = S(0)				(20)(00)		(20) + (2)	2) + (22a)	(220) -	18.08	(33)
			,			1/m21				.(30) + (32		(32e) =	5544.48	
		•	•	P = Cm	,			raciaaly the		tive Value		abla 1f	250	(35)
	-	ad of a de		tails of the ulation.	constructi	ion are not	known pr	ecisely the	Indicative	values of		able II		
Therm	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						3.67	(36)
if details	of therma	al bridging	are not kr	nown (36) =	= 0.15 x (3	1)								
Total fa	abric he	at loss							(33) +	(36) =			21.74	(37)
Ventila	tion hea	at loss ca	alculated	monthly	/				(38)m	= 0.33 × (25)m x (5)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	22.32	22.2	22.08	21.52	21.42	20.93	20.93	20.84	21.12	21.42	21.63	21.85		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	44.07	43.95	43.83	43.27	43.16	42.68	42.68	42.59	42.87	43.16	43.38	43.6		
Stroma I	FSAP 201	2 Version:	1.0.3.11	(SAP 9.92)	- http://wv	ww.stroma	.com	•		Average =	Sum(39)	12 /12=	43.2 p ;	age 2 o ⁽³⁹⁾

Heat lo	ss para	meter (H	HLP), W/	/m²K					(40)m	= (39)m ÷	÷ (4)			
(40)m=	0.87	0.87	0.87	0.86	0.85	0.84	0.84	0.84	0.85	0.85	0.86	0.86		
Numbo	r of day	vs in mo	nth (Tab	le 12)				•	,	Average =	Sum(40)1	12 /12=	0.86	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ting ene	rgy requi	irement:								kWh/ye	ear:	
if TF/	۹ > 13.9	ipancy, 9, N = 1 9, N = 1		: [1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		71		(42)
Reduce t	he annua	al average		usage by	5% if the a	welling is	designed	(25 x N) to achieve		se target o		.76		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage ii	n litres pei	r day for ea		Vd,m = fa	ctor from	Table 1c x	-			1			
(44)m=	82.24	79.25	76.25	73.26	70.27	67.28	67.28	70.27	73.26	76.25	79.25	82.24		
											ım(44) ₁₁₂ =		897.12	(44)
Energy c	ontent of	hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor	oth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	121.95	106.66	110.06	95.96	92.07	79.45	73.62	84.48	85.49	99.63	108.76	118.11		_
lf instanta	aneous w	vater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =		1176.26	(45)
(46)m=	1 <mark>8.29</mark>	16	16.51	14. <mark>39</mark>	13.81	11.92	11.04	12.67	12.82	14.95	16.31	17.72		(46)
Water s	-													
				-				within sa	ame ves	sel		0		(47)
	•	-	and no ta		-			. ,		(0)	(47)			
Water s			not wate	er (this ir	iciudes i	nstantar	ieous co	ombi boil	ers) ente	er 'O' in ((47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/dav):					0		(48)
,			m Table			v	,					0		(49)
•			· storage		ear			(48) x (49)) =			0		(50)
0,			eclared o			or is not	known:					0		()
		-	factor fr		le 2 (kW	h/litre/da	ay)					0		(51)
	•	leating s	ee secti	on 4.3								•		(50)
			m Table	2b								0	r	(52) (53)
-			storage		ar			(47) x (51)) x (52) x (53) =				(54)
•••		(54) in (5	-	,, y	Jai			(11) x (01)	, x (0 <u></u>) x (0		(55)
Water s	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m		-		
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	r contains	s dedicate	d solar sto	rage, (57)	i m = (56)m	x [(50) – (I H11)] ÷ (5	1 50), else (5	1 7)m = (56)	m where (H11) is fro	m Append	l lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	/ circuit	loss (ar	nnual) fro	om Table	e 3							0		(58)
-		•	,			59)m = ((58) ÷ 36	65 × (41)	m				-	
(mod	lified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	ostat)		L	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)

Combi	loss ca	lculated	for ea	ch	month (61)m =	(60)) ÷ 36	65 × (41))m									
(61)m=	23.7	21.39	23.6	5	22.85	23.59	2	2.81	23.55	23.	58	22.83	23.6	3	22.9	23.	.69		(61)
Total h	eat req	uired for	water	he	ating ca	alculated	d fo	r eacl	h month	(62)	m =	0.85 × ((45)m	+	(46)m +	(57)	m +	(59)m + (61)m	
(62)m=	145.65	128.05	133.7	'1	118.81	115.67	1	02.26	97.17	108	.06	108.33	123.2	26	131.66	141	.79		(62)
Solar DH	IW input	calculated	using A	hppe	ndix G or	Appendix	κΗ	(negati	ve quantity	/) (ent	er '0'	' if no sola	r contri	ibut	ion to wate	er hea	ating)		
(add ag	dditiona	al lines if	FGHF	RS a	and/or V	VWHRS	S ap	plies	, see Ap	penc	lix G	G)							
(63)m=	0	0	0		0	0		0	0	0		0	0		0	(C		(63)
Output	from w	ater hea	ter																
(64)m=	145.65	128.05	133.7	'1	118.81	115.67	1	02.26	97.17	108	.06	108.33	123.2	26	131.66	141	.79		
			-								Outp	out from w	ater he	ate	r (annual)₁	112		1454.42	(64)
Heat g	ains fro	m water	heatir	ng,	kWh/mo	onth 0.2	5 ′	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	k [(46))m	+ (57)m	+ (5	i9)m]	
(65)m=	46.47	40.81	42.5 ⁻	1	37.62	36.51	3	32.12	30.37	33.	99	34.13	39.0	94	41.89	45.	.19		(65)
inclu	de (57)	m in calo	culatio	n o	f (65)m	only if c	ylir	nder i	s in the c	dwell	ing	or hot w	ater i	s fr	om com	mun	ity h	eating	
5. Int	ernal g	ains (see	e Table	e 5	and 5a)):													
Metabo	olic gair	ns (Table	e 5), W	/att	S														
	Jan	Feb	Ma		Apr	May	Γ	Jun	Jul	A	ug	Sep	00	ct	Nov	D	ec		
(66)m=	85.39	85.39	85.39	9	85.39	85.39	8	35.39	85.39	85.3	39	85.39	8 <mark>5.3</mark>	9	85.39	85.	.39		(66)
Lightin	g gains	(calcula	ted in	Ap	pendix l	_, equat	tion	L9 o	r L9a), a	lso s	ee	Table 5							
(67)m=	13.39	11.89	9.67		7.32	5.47	4	4.62	4.99	6.4	.9	8.71	11.0	6	12.91	13.	.76		(67)
Appliar	nces ga	ins (calc	ulated	l in	Append	lix L, eo	uat	tion L	13 or L1	3a), a	also	see Ta	ble 5						
(68)m=		150.34	146.4	-	138 <mark>.16</mark>	, 127.71	<u> </u>	17.88	111.31	109		113.66	121.9	94	132.4	142	2.23		(68)
Cookin	a gains	s (calcula	ted in	Ap	pendix	L. equa	tior	ו L15	or L15a)), als	0 SE	e Table	5			Į			
(69)m=	31.54	31.54	31.54	- i	31.54	31.54	-	31.54	31.54	31.		31.54	31.5	64	31.54	31.	.54		(69)
Pumps	and fa	ns gains	(Tabl	e 5	a)		1								I				
(70)m=	3	3	3	T	3	3	Γ	3	3	3		3	3		3		3		(70)
Losses	e.a. ev	vaporatic	n (neo	nati	ve valu	es) (Tab	ble	5)							I	1			
(71)m=		- <u>-</u>	r È i	T	-68.31	-68.31	1	68.31	-68.31	-68.	31	-68.31	-68.3	31	-68.31	-68	.31		(71)
Water	heating	ı gains (T	r Table <i>(</i>	5)			I						I						
(72)m=	62.46	60.73	57.14	ŕ	52.25	49.08	4	4.61	40.82	45.	68	47.41	52.4	.7	58.18	60.	.74		(72)
Total i	nterna	l gains =	I				1	(66)	m + (67)m	L 1 + (68	3)m +	- (69)m + (l (70)m -	+ (7	1)m + (72))m			
(73)m=	276.26	· · · · · ·	264.8	7	249.35	233.87	2	18.73	208.74	213	.56	221.4	237.0	09	255.1	268	3.35		(73)
6. Sol	ar gain	s:														I			
Solar g	ains are	calculated	using s	olar	flux from	Table 6a	and	associ	iated equa	tions	to co	nvert to th	ne appli	icat	le orientat	tion.			
Orienta		Access F			Area			Flu				g_			FF			Gains	
	-	Table 6d			m²			Tal	ole 6a		Т	able 6b		Т	able 6c			(W)	
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	3	6.79	x		0.63	×		0.7		=	49.59	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	3	6.79	×		0.63	x		0.7		=	49.59	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	1.0	8	x	3	6.79	x		0.63	x	Γ	0.7		=	12.14	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	6	2.67	x		0.63	x	Ē	0.7		=	84.47	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	4.4	1	x	6	2.67	x		0.63	×	Γ	0.7		=	84.47	(77)

Southeast 0.9x	0.77	x	1.08	>	((62.67	x	0.63	x	0.7	=	20.69	(77)
Southeast 0.9x	0.77	x	4.41)	<u>د</u> ٤	35.75	x	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	x	4.41)	(8	35.75	x	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	x	1.08)	(8	35.75	x	0.63	x	0.7	=	28.3	(77)
Southeast 0.9x	0.77	x	4.41)	(1	06.25	x	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	x	4.41)	<mark>ر</mark> 1	06.25	x	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	x	1.08)	<mark>ر</mark> 1	06.25	x	0.63	x	0.7	=	35.07	(77)
Southeast 0.9x	0.77	x	4.41)	(1	19.01	x	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	x	4.41)	(1	19.01	x	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	x	1.08)	<mark>ر</mark> 1	19.01	x	0.63	x	0.7	=	39.28	(77)
Southeast 0.9x	0.77	x	4.41)	(1	18.15	x	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	x	4.41)	<mark>ر</mark> 1	18.15	x	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	x	1.08)	(1	18.15	x	0.63	×	0.7	=	39	(77)
Southeast 0.9x	0.77	x	4.41)	(1	13.91	x	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	x	4.41)	(1	13.91	x	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	x	1.08)	(1	13.91	x	0.63	×	0.7	=	37.6	(77)
Southeast 0.9x	0.77	x	4.41)	(1	04.39	x	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	4.41		(1	04.39	х	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	1.08	,	(1	04.39	x	0.63	x	0.7	- 1	34.46	(77)
Southeast 0.9x	0.77	x	4.41)	(9	92.85	x	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	4.41			92.85	x	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	1.08	, ((9	92.85	х	0.63	x	0.7	=	30.65	(77)
Southeast 0.9x	0.77	x	4.41	, ,	< <u> </u>	69.27	x	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	4.41	,	(69.27	x	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	1.08)	((69.27	x	0.63	x	0.7	=	22.86	(77)
Southeast 0.9x	0.77	x	4.41)	(14.07	x	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	4.41)	<	14.07	x	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	1.08)	(14.07	x	0.63	x	0.7	=	14.55	(77)
Southeast 0.9x	0.77	x	4.41)	(3	31.49	x	0.63	x	0.7	=	42.44	(77)
Southeast 0.9x	0.77	x	4.41)	(3	31.49	x	0.63	x	0.7	=	42.44	(77)
Southeast 0.9x	0.77	x	1.08)	(3	31.49	x	0.63	x	0.7	=	10.39	(77)
Solar gains in	1 1	lculated				.	(83)m	= Sum(74)m .	(82)m	_			
(83)m= 111.32		259.45		360.07	357.47	344.64	315	.84 280.93	209.57	133.34	95.27		(83)
Total gains –			· , ,		. ,	i	·					I	(
(84)m= 387.59	464.2	524.32	570.82 5	593.95	576.2	553.38	529	.4 502.33	446.66	388.44	363.62		(84)
7. Mean inte	rnal tempe	erature	(heating s	eason)									
Temperature	e during he	eating p	eriods in t	he livin	g area	from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fa	ctor for ga	ins for I	iving area	, h1,m	(see Ta	able 9a)				_			
Jan	Feb	Mar	Apr	May	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.97	0.93	0.82	0.66	0.47	0.34	0.3	0.58	0.87	0.98	0.99		(86)
Mean interna	al tempera	ture in l	iving area	T1 (fo	llow ste	ps 3 to 7	7 in T	able 9c)					
(87)m= 20.31	20.5	20.71	20.9	20.98	21	21	2'	1 20.99	20.88	20.56	20.27		(87)

Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)					
(88)m=	20.19	20.19	20.2	20.21	20.21	20.22	20.22	20.22	20.21	20.21	20.2	20.2		(88)
Utilisa	ation fac	tor for g	ains for I	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.99	0.97	0.91	0.79	0.61	0.42	0.28	0.31	0.52	0.83	0.97	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (fe	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	19.28	19.56	19.85	20.1	20.19	20.21	20.22	20.22	20.21	20.08	19.65	19.23		(90)
			<u> </u>						f	LA = Livin	g area ÷ (4	ł) =	0.49	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) – fl	$A \times T1$	+ (1 – fl	Δ) x T2					
(92)m=	19.79	20.02	20.28	20.49	20.58	20.6	20.6	20.6	20.6	20.48	20.1	19.75		(92)
Apply	adjustn	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.79	20.02	20.28	20.49	20.58	20.6	20.6	20.6	20.6	20.48	20.1	19.75		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter			ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut			or gains					•	0	0.1		Du		
Litilio	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.99	0.97	ains, hm 0.92	0.8	0.63	0.44	0.31	0.34	0.55	0.84	0.97	0.99		(94)
			, W = (94			0.11	0.01	0.01	0.00	0.01	0.07	0.00		
(95)m=	382.82	448.65	480.64	458.52	374.78	255.4	170.79	178.93	275.65	377.14	376.58	360.4		(95)
	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	los <mark>s rate</mark>	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	6 <mark>82.7</mark>	664.59	603.77	501.56	383. <mark>2</mark> 5	256.14	170.85	179.03	278.41	42 <mark>6.3</mark> 1	564.02	677.82		(97)
Spac	e heatin	g require	ement fo	<mark>r eac</mark> h n	nonth, <mark>k</mark> l	Nh/mont	t <mark>h = 0</mark> .02	24 x [(97]) <mark>m – (9</mark> 5)m] x (4 ⁻	1)m			
(98)m=	223.11	145.11	91.61	30.99	6.3	0	0	0	0	36.58	134.96	236.16		
								Tota	l per year	(kWh/year	') = Sum(98	B) _{15,912} =	904.81	(98)
Space	e heatin	g require	ement in	kWh/m²	/year								17.88	(99)
9a. En	ergy rec	luiremer	nts – Indi	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
Spac	e heatir	ng:												
Fract	ion of sp	ace hea	at from se	econdar	y/supple	mentary	system						0	(201)
Fract	ion of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fract	ion of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) × [1 – ((203)] =			1	(204)
Efficie	ency of r	main spa	ace heat	ing syste	em 1								92.7	(206)
Efficie	ency of s	seconda	ry/supple	ementar	y heating	g system	n, %					İ	0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWł	n/year
Space			ement (c)								,
	223.11	145.11	91.61	30.99	6.3	0	0	0	0	36.58	134.96	236.16		
(211)m	n = {[(98)m x (20)4)]}x 1	00 ÷ (20)6)									(211)
、 ,	240.68	156.54	98.82	33.43	, 6.79	0	0	0	0	39.46	145.58	254.76		
			<u></u>					Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	976.07	· (211)
Space	e heatin	g fuel (s	econdar	y), kWh/	month							I		
= {[(98)m x (20)1)]}x ¹	00 ÷ (20	8)										
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
								Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)

Water heating

Output from water heater (calcul	lated above)									
	118.81 115.67	102.26	97.17	108.06	108.33	123.26	131.66	141.79]	
Efficiency of water heater	II								87	(216)
(217)m= 88.61 88.41 88.08	87.55 87.14	87	87	87	87	87.6	88.35	88.67		(217)
Fuel for water heating, kWh/mor									-	
$(219)m = (64)m \times 100 \div (217)m$ (219)m = 164.36 144.83 151.81	1 135.71 132.74	117.54	111.69	124.21	124.51	140.7	149.03	159.91	1	
(219)11= 104.30 144.83 151.81	135.71 132.74	117.54	111.09		l = Sum(2		149.03	159.91	1657.06	(219)
Annual totals							Wh/year		kWh/year	
Space heating fuel used, main s	ystem 1								976.07	
Water heating fuel used									1657.06]
Electricity for pumps, fans and e	lectric keep-hot	t								_
central heating pump:								30		(230c)
boiler with a fan-assisted flue								45		(230e)
Total electricity for the above, kV	Wh/year			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting									236.49	(232)
Electricity generated by PVs									-554.44	(233)
12a. CO2 emissions – Individua	al heating syste	En	uding mi ergy /h/year	cro-CHP		Emiss kg CO2	ion fac 2/kWh	tor	Emissions kg CO2/yea	
Space heating (main system 1)		(211	1) x			0.2	16	=	210.83	(261)
Space heating (secondary)		(215	5) x			0.5	19	=	0	(263)
Water heating		(219	9) x			0.2	16	=	357.93	(264)
Space and water heating		(261	1) + (262)	+ (263) + (264) =				568.76	(265)
Electricity for pumps, fans and e	lectric keep-hot	(231	1) x			0.5	19	=	38.93	(267)
Electricity for lighting		(232	2) x			0.5	19	=	122.74	(268)
Energy saving/generation techno Item 1	ologies					0.5	19	=	-287.76	(269)
Total CO2, kg/year					sum o	f (265)(2	271) =		442.66	(272)
Dwelling CO2 Emission Rate					(272)	÷ (4) =			8.75	(273)
EI rating (section 14)									94	(274)

User Details:		
Assessor Name:Stroma Number:Software Name:Stroma FSAP 2012Software Version:Version	n: 1.0.3.11	
Property Address: Arlington 3 Bed GND 76		
Address :		
1. Overall dwelling dimensions:		
Area(m ²) Av. Height(m)	Volume(m ³)	
Ground floor 76.1 (1a) x 2.3 (2a) =	175.03	(3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 76.1 (4)		
Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) =$	175.03	(5)
2. Ventilation rate:		
main secondary other total heating heating	m ³ per hour	
Number of chimneys $0 + 0 = 0$ $x 40 = 0$	0	(6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$	0	(6b)
Number of intermittent fans	20	(7a)
Number of passive vents $0 \times 10 =$	0	(7b)
Number of flueless gas fires	0	(7c)
Air ch	anges per hour	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 20 \div (5) = $	0.11	(8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)		(0)
Number of storeys in the dwelling (ns) Additional infiltration [(9)-1]x0.1 =		(9) (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		(10)
if both types of wall are present, use the value corresponding to the greater wall area (after	0	()
deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		(12)
If no draught lobby, enter 0.05, else enter 0		(12)
Percentage of windows and doors draught stripped		(14)
Window infiltration 0.25 - [0.2 x (14) ÷ 100] =		(15)
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$		(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area	4	(17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.31	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used		
Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$		(19)
		(20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	0.27	(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		

Adjuste	ed infiltr	ation rat	e (allow	ing for sh	elter an	d wind s	peed) =	(21a) x	(22a)m					
<i>.</i>	0.34	0.33	0.33	0.29	0.29	0.25	0.25	0.25	0.27	0.29	0.3	0.31		
		<i>ctive air</i> al ventila	•	rate for t	he appli	cable ca	se						0	(23a)
				endix N, (2	3b) = (23a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23b)
		• •	0 11	iency in %	, ,	, ,	•	<i>,,</i> .	,	, , ,			0	(23c)
			-	entilation	-					2b)m + ()	23b) x [[,]	1 – (23c)	-	(200)
(24a)m=		0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	i ed mecha	ı anical ve	entilation	without	heat rec	: overv (N	и ЛV) (24b	m = (22)	1 2b)m + (2	23b)		1	
, (24b)m=		0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	iouse ex	tract ver	ntilation c	or positiv	e input v	/entilatic	n from c	outside				1	
í	if (22b)r	n < 0.5 >	‹ (23b), †	then (24a	c) = (23b); otherv	vise (24	c) = (22b	o) m + 0.	.5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
				ole hous										
	, <i>,</i>	· · ·	<u>, </u>	m = (22k)	,	,	, 	-`	<u> </u>	-	0.55	0.55	1	(244)
(24d)m=		0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(24d)
	0.56	change 0.56	rate - er	nter (24a) or (24b 0.54	o) or (24)	c) or (24 0.53	d) in box	(25) 0.54	0.54	0.55	0.55	1	(25)
(25)m=	0.56	0.00	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(23)
3. He	at l <mark>osse</mark>	s and he	eat loss	paramete	er:									
ELEN	IENT	Gros		Openin		Net Ar		U-valı W/m2		AXU		k-value		A X k kJ/K
Doors		area	(1112)	m		A ,r				(W/ł	<)	kJ/m²+ł		
	ws Type	. 1				1.89			=	3.024	H			(26)
						4.41		/[1/(1.4)+		5.85	H			(27)
	ws Type					4.41		/[1/(1.4)+		5.85	L.			(27)
	ws Type					4.41		/[1/(1.4)+		5.85				(27)
	ws Type	94				2.52	x1,	/[1/(1.4)+	0.04] =	3.34	╡,			(27)
Floor						76.1	x	0.11	=	8.37099	9		\exists	(28)
Walls		56.3		17.64	4	38.72	<u>x</u>	0.17	=	6.58				(29)
Total a	rea of e	elements	, m²			132.4	6							(31)
Party v	vall					38.24	x	0	=	0				(32)
Party c	eiling					76.1								(32b)
				effective wil nternal wall			ated using	formula 1	/[(1/U-valı	ıe)+0.04] a	is given in	paragraph	1 3.2	
		ss, W/K			s anu pan	1110115		(26)(30)) + (32) =				38.86	(33)
		Cm = S(•	0)				. , . ,		(30) + (32	2) + (32a).	(32e) =	15713.9	
			. ,	[–] = Cm ÷	· TFA) in	⊨k.J/m²K				tive Value:			250	(35)
		•	•	etails of the				ecisely the				able 1f	230	(00)
can be ı	ised inste	ad of a de	tailed calc	ulation.				-						
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						8.22	(36)
			are not kr	nown (36) =	: 0.15 x (З	1)			(22) -	(26) -				
	abric he		alaulata	1 months	,					(36) =	25)m v (5)		47.07	(37)
venula		Feb	i			lun	11	Δυσ	. ,	$= 0.33 \times ($			1	
	Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	l	

(38)m=	32.23	32.1	31.97	31.37	31.26	30.74	30.74	30.64	30.94	31.26	31.49	31.73		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	79.3	79.17	79.05	78.45	78.34	77.81	77.81	77.72	78.02	78.34	78.56	78.8		
Heat lo	iss nara	meter (F	HLP), W	/m²K						Average = = (39)m ÷		12 /12=	78.45	(39)
(40)m=	1.04	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.03	1.03	1.03	1.04		
										Average =	Sum(40)1.	₁₂ /12=	1.03	(40)
Numbe			nth (Tab	<u>, </u>										
(Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4 3.67														
4. Wa	ter hea	ting ene	rgy requ	irement:								kWh/yea	ar:	
		upancy,		F.4	(38		(42)
		9, $N = 1$ 9, $N = 1$	+ 1.76 x	(1 - exp	(-0.0003	349 X (11	-A -13.9)2)] + 0.0	JU13 X (IFA -13.	9)			
Annual	averag	e hot wa	ater usag									.84		(43)
		-	hot water person pe			-	-	o achieve	a water us	se target o	t			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate			r day for ea					<u> </u>		000	1100			
(44)m=	9 <mark>9.92</mark>	96.29	92.65	89.02	85.39	81.75	81.75	85.39	89.02	9 <mark>2.65</mark>	96.29	<mark>9</mark> 9.92		
										Total = Su			1090.04	(44)
Energy o	content of		used - cal	lculated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	0Tm / 3600) kWh/mor	nth (see Ta	bles 1b, 1	c, 1d)		
(45)m=	148.18	129.6	133.73	116.59	111.87	96.54	89.46	102.65	103.88	121.06	132.15	143.5		—
lf instant	aneous v	vater heati	ng at point	t of use (no	o hot water	^r storage),	enter 0 in	boxes (46		Tota <mark>l = Su</mark>	m(45) ₁₁₂ =	• L	1429.21	(45)
(46)m=	22.23	19.44	20.06	17.49	16.78	14.48	13.42	15.4	15.58	18.16	19.82	21.53		(46)
· · ·	storage			_			_							
Storage	e volum	ne (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
	•	-	and no ta		-			. ,		(0) : . (47)			
	ise it no storage		hot wate	er (this ir	iciudes i	nstantar	ieous co	iioa iam	ers) ente	er 'U' in (47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature f	actor fro	m Table	2b								0		(49)
0,			r storage					(48) x (49)) =			0		(50)
			eclared of	•										(54)
		-	factor fr		ez(kvv	n/iitie/ua	iy)					0		(51)
	•	from Ta										0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)
			r storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	(54) in (8		(((50)				0		(55)
	-		culated t		i			((56)m = (
(56)m=	0	0 s dodicato	0 d color sto	0	0 = (56)m	0	0	0	$0_{7} = (56)$		0 ⊎11) is fro	0 m Appendix	ц	(56)
						· ·		· ·	· · ·					
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)

Primary circuit loss (annual) from Table 3 0 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)														(58)
(moo	dified by	factor f	rom Tab	le H5 if t	here is s	olar wat	ter heati	ng and a	cylinde	r thermo	stat)		1	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	23.84	21.5	23.77	22.95	23.68	22.88	23.62	23.66	22.92	23.73	23.02	23.82		(61)
Total h	eat requ	ired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61))m
(62)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		(62)
Solar DH	HW input c	alculated	using App	endix G or	Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditional	lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from wa	ater hea	ter											
(64)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		
			-	-			-	Outp	out from wa	ater heate	r (annual)₁	12	1708.6	(64)
Heat g	ains fror	n water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	55.23	48.47	50.41	44.5	43.12	37.82	35.65	40.05	40.27	46.19	49.69	53.67		(65)
in <mark>clu</mark>	de (57)r	n in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	eating	
5. Int	ernal ga	ins (see	Table {	5 and 5a):									
Metab	olic gain	s (Table	e 5), Wat	ts										
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	119.23	119.23	11 <mark>9.23</mark>	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23		(66)
Lightin	g gains	(calcula	ted in Ar	pendix	L, equat	ion L9 o	r L9a), a	lso see [.]	Table 5					
(67)m=	18.89	16.78	13.65	10.33	7.72	6.52	7.04	9.16	12.29	15.61	18.21	19.42		(67)
Applia	nces gai	ns (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	211.1	213.29	207.77	196.02	181.18	167.24	157.93	155.74	161.26	173.01	187.84	201.78		(68)
Cookir	a aains	(calcula	ted in A	ppendix	L. equat	ion L15	or L15a), also se	e Table	5	1	1		
(69)m=	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92		(69)
	and far	ns dains	ر (Table ؛	1			ļ				ļ			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
		aporatio	n (nega	ı tive valu	L es) (Tab	le 5)								
(71)m=	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39		(71)
	heating	nains (T		ļ			ļ	ļ		ļ	ļ	<u> </u>		
(72)m=	74.23	72.12	67.75	61.81	57.96	52.53	47.92	53.83	55.93	62.08	69.02	72.14		(72)
	nternal			0.101	01100			n + (68)m +						
(73)m=	365.99	363.96	350.94	329.93	308.63	288.06	274.66	280.49	291.25	312.46	336.84	355.11		(73)
	ar gains		000.04	020.00	000.00	200.00	27 - 1.00	200.40	201.20		000.04			()
			using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	e applicat	ole orientat	ion.		
-	ation: A		-	Area		Flu			g_		FF		Gains	
		abla 6d		m2			hlo 6a	т	abla 6h	т	abla 6c		(\\\)	

Unentation.	Table 6d		m ²		Table 6a		g_ Table 6b		Table 6c		(W)	
Southeast 0.9	x 0.77	x	4.41	x	36.79	x	0.63	x	0.7	=	49.59	(77)
Southeast 0.9	x 0.77	x	4.41	x	62.67	x	0.63	×	0.7	=	84.47	(77)

Southeast 0.9x		Ι		ι		1				1	··	
L	0.77	x	4.41	X	85.75	×	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	X	4.41	X	106.25	×	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	X	4.41	X	119.01	X	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	X	4.41	X	118.15	×	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	X	4.41	X	113.91	X	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	х	4.41	X	104.39	X	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	4.41	x	92.85	X	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	4.41	X	69.27	X	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	4.41	x	44.07	×	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	4.41	X	31.49	×	0.63	x	0.7	=	42.44	(77)
Southwest _{0.9x}	0.77	x	2.52	x	36.79	ļ	0.63	x	0.7	=	28.34	(79)
Southwest _{0.9x}	0.77	x	2.52	x	62.67		0.63	x	0.7	=	48.27	(79)
Southwest _{0.9x}	0.77	x	2.52	x	85.75		0.63	x	0.7	=	66.04	(79)
Southwest _{0.9x}	0.77	x	2.52	x	106.25		0.63	x	0.7	=	81.83	(79)
Southwest _{0.9x}	0.77	x	2.52	x	119.01		0.63	x	0.7	=	91.66	(79)
Southwest _{0.9x}	0.77	x	2.52	x	118.15		0.63	x	0.7	=	90.99	(79)
Southwest _{0.9x}	0.77	x	2.52	x	113.91		0.63	x	0.7	=	87.73	(79)
Southwest0.9x	0.77	х	2.52	X	104.39		0.63	x	0.7	=	80.4	(79)
Southwest0.9x	0.77	x	2.52	х	92.85		0.63	x	0.7	=	71.51	(79)
Southwest _{0.9x}	0. <mark>77</mark>	x	2.52	x	69.27		0.63	x	0.7	=	53.35	(79)
Southwest0.9x	0.7 <mark>7</mark>	x	2.52	x	44.07		0.63	x	0.7	=	33.94	(79)
Southwest _{0.9x}	0.77	x	2.52	x	31.49		0.63	x	0.7	=	24.25	(79)
Northwest 0.9x	0.77	x	4.41	x	11.28	×	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	11.28	×	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	x	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	×	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	×	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	×	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	×	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	×	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	×	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	×	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	×	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	x	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	91.1	×	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	x	4.41	x	91.1	x	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	x	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	x	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	x	4.41	x	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	x	4.41	x	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	x	4.41	x	28.07	x	0.85	x	0.7	=	51.04	(81)

Northwest 0.9x 0.77	<u>م</u>				ı —						
	_ ×	4.41	×	28.07	X	0.85		0.7	=	51.04	(81)
Northwest 0.9x 0.77	x	4.41	x	14.2	×	0.85	x	0.7	=	25.82	(81)
Northwest 0.9x 0.77	x	4.41	x	14.2	x	0.85	x	0.7	=	25.82	(81)
Northwest 0.9x 0.77	x	4.41	x	9.21	x	0.85	x	0.7	=	16.76	(81)
Northwest 0.9x 0.77	x	4.41	x	9.21) x	0.85	x	0.7	=	16.76	(81)
Solar gains in watts, calcu	ated for e	ach month	1		(83)m = S	um(74)m .	(82)m	-			
(83)m= 118.96 216.26 33	2.1 472.1	7 584.26	604.	\$ 572.56	485.22	380.02	248.78	144.97	100.2		(83)
Total gains – internal and	solar (84)r	n = (73)m	+ (83)	m , watts							
(84)m= 484.95 580.22 68	3.04 802.	1 892.89	892.4	5 847.22	765.71	671.27	561.24	481.81	455.31		(84)
7. Mean internal tempera	ture (heat	ng seasor	ר)								
Temperature during heat	ng period	s in the livi	ing are	a from Tal	ble 9, Th	1 (°C)				21	(85)
Utilisation factor for gains	for living	area, h1,n	n (see	Table 9a)							
Jan Feb M	/lar Ap	r May	Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1 0.99 0	98 0.91	0.75	0.55	0.4	0.46	0.74	0.96	0.99	1		(86)
Mean internal temperatu		area T1 (f		tons 3 to -	I 7 in Tabl					1	
	0.4 20.7	`	20.9		21	20.95	20.65	20.23	19.9	1	(87)
							20.00	20.20	10.0		(-)
Temperature during heat										1	(00)
(88)m= 20.05 20.05 20	.05 20.0	6 20.06	20.0	3 20.06	20.07	20.06	20.06	20.06	20.05		(88)
Utilisation factor for gains	for rest o	f dwelling,	h2,m	see Table	9a)						
(89)m= 1 0.99 0	97 0.88	0.69	0.47	0.32	0.37	0.66	0.94	0.99	1		(89)
Mean internal temperatu	e in <mark>the r</mark> e	st of dwel	ling T2	(follow ste	eps 3 to	7 in Tabl	e 9 <mark>c)</mark>				
(90)m= 18.64 18.9 19	.29 19.7	5 19.99	20.0	3 20.06	20.06	20.02	19.66	19.06	18.59		(90)
					-	f	LA = Livin	g area ÷ (4	4) =	0.33	(91)
Mean internal temperatu	e (for the	whole dwe	ellina) :	= fl A x T1	+ (1 – fl	A) x T2					
(92)m= 19.07 19.3 19							19.99	19.44	19.02]	(92)
Apply adjustment to the r										l	
	.66 20.0		20.3		20.37	20.33	19.99	19.44	19.02		(93)
8. Space heating require	nent		1	-	1			<u> </u>	Į		
Set Ti to the mean intern	al tempera	ture obtai	ned at	step 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
Set Ti to the mean intern the utilisation factor for g			ned at	step 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
the utilisation factor for ga	ains using ⁄lar Ap	Table 9a	ned at Jur		Table 9	b, so tha Sep	t Ti,m=(Oct	76)m an Nov	d re-calc Dec	culate	
the utilisation factor for g Jan Feb M Utilisation factor for gains	ains using /lar Ap , hm:	Table 9a r May	Ju	ı Jul		1		, 	i	culate	
the utilisation factor for ga Jan Feb M Utilisation factor for gains (94)m= 1 0.99 0	ains using Mar Ap , hm: 96 0.88	Table 9a r May				1		, 	i	culate 	(94)
the utilisation factor for given by the utilisation factor for gains (94)m= 1 0.99 0 Useful gains, hmGm , W	ains using Aar Ap , hm: 96 0.88 = (94)m x	Table 9a r May 0.71 (84)m	Jui 0.5	n Jul 0.35	Aug 0.4	Sep 0.69	Oct 0.94	Nov 0.99	Dec 1	culate 	
the utilisation factor for gas Jan Feb M Utilisation factor for gains (94)m= 1 0.99 0 Useful gains, hmGm , W (95)m= 482.6 572.95 65	ains using Aar Ap , hm: 96 0.88 = (94)m x 7.71 706.3	Table 9a r May 3 0.71 (84)m 631.7	Uu 0.5	n Jul 0.35	Aug	Sep	Oct	Nov	Dec	culate 	(94) (95)
the utilisation factor for given by the utilisation factor for gains (94)m= 1 0.99 0 Useful gains, hmGm , W (95)m= 482.6 572.95 65 Monthly average external	ains using Aar Ap /ar Ap 96 0.88 = (94)m x 7.71 706.3 I temperat	Table 9a r May 6 0.71 (84)m 631.7 ure from T		1 Jul 0.35 6 292.88	Aug 0.4 307.37	Sep 0.69 460.15	Oct 0.94 524.85	Nov 0.99 476.52	Dec 1 453.7	culate 	(95)
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm , W (95)m = 482.6 572.95 65 Monthly average externat (96)m = 4.3 4.9 6	ains using Aar Ap /ar Ap 96 0.88 = (94)m x 7.71 706.3 I temperat .5 8.9	Table 9a r May 6 0.71 (84)m 631.7 ure from T 11.7	0.5 443.4 able 8 14.6	1 Jul 0.35 6 292.88 16.6	Aug 0.4 307.37 16.4	Sep 0.69 460.15 14.1	Oct 0.94 524.85 10.6	Nov 0.99	Dec 1	culate 	
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm , W (95)m = 482.6 572.95 65 Monthly average externation $(96)m = 4.3 4.9 66$ Heat loss rate for mean in	ains using Aar Ap /ar Ap 96 0.88 = (94)m x 7.71 706.3 I temperat .5 8.9 nternal ten	Table 9a r May a 0.71 (84)m 631.7 ure from T 11.7 pperature, 11.7		1 Jul 0.35 6 292.88 16.6 V =[(39)m	Aug 0.4 307.37 16.4 x [(93)m	Sep 0.69 460.15 14.1 – (96)m	Oct 0.94 524.85 10.6	Nov 0.99 476.52 7.1	Dec 1 453.7 4.2	culate 	(95) (96)
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm, W (95)m = 482.6 572.95 65 Monthly average external (96)m = 4.3 4.9 6 Heat loss rate for mean in (97)m = 1170.96 1140.02 10	ains using Mar Ap 96 0.88 = (94)m x 7.71 706.3 I temperat .5 8.9 nternal ten 39.9 875.5	Table 9a r May a 0.71 (84)m 631.7 ure from T 11.7 nperature, 03 673.52	Jun 0.5 443.4 able 8 14.6 Lm, V 448.4	1 Jul 0.35 6 292.88 16.6 V =[(39)m 9 293.43	Aug 0.4 307.37 16.4 x [(93)m 308.58	Sep 0.69 460.15 14.1 - (96)m 485.84	Oct 0.94 524.85 10.6] 735.25	Nov 0.99 476.52 7.1 969.64	Dec 1 453.7	culate 	(95)
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm, W (95)m = 482.6 572.95 65 Monthly average externations (96)m = 4.3 4.9 66 Heat loss rate for mean in $(97)m = 1170.96 1140.02 10$ Space heating requirements	ains using Aar Ap /ar Ap /ar Ap 96 0.88 = (94)m x 7.71 706.3 1 temperat .5 8.9 nternal ten 39.9 875.5 nt for eacl	Table 9a r May a 0.71 (84)m 631.7 ure from T 11.7 pperature, 3 a 673.52 n month, k		10.35 6 292.88 16.6 V =[(39)m 9 293.43 ponth = 0.02	Aug 0.4 307.37 16.4 x [(93)m 308.58 24 x [(97	Sep 0.69 460.15 14.1 - (96)m 485.84)m - (95	Oct 0.94 524.85 10.6] 735.25)m] x (4	Nov 0.99 476.52 7.1 969.64 1)m	Dec 1 453.7 4.2 1167.74	culate 	(95) (96)
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm, W (95)m = 482.6 572.95 65 Monthly average externations (96)m = 4.3 4.9 66 Heat loss rate for mean in $(97)m = 1170.96 1140.02 10$ Space heating requirements	ains using Mar Ap 96 0.88 = (94)m x 7.71 706.3 I temperat .5 8.9 nternal ten 39.9 875.5	Table 9a r May a 0.71 (84)m 631.7 ure from T 11.7 pperature, 3 a 673.52 n month, k	Jun 0.5 443.4 able 8 14.6 Lm, V 448.4	1 Jul 0.35 6 292.88 16.6 V =[(39)m 9 293.43	Aug 0.4 307.37 16.4 x [(93)m 308.58 24 x [(97 0	Sep 0.69 460.15 14.1 - (96)m 485.84)m - (95 0	Oct 0.94 524.85 10.6] 735.25)m] x (4 156.54	Nov 0.99 476.52 7.1 969.64 1)m 355.04	Dec 1 453.7 4.2 1167.74 531.25	 	(95) (96) (97)
the utilisation factor for given by the utilisation factor for gains $(94)m = 1 0.99 0$ Useful gains, hmGm, W (95)m = 482.6 572.95 65 Monthly average externations (96)m = 4.3 4.9 66 Heat loss rate for mean in $(97)m = 1170.96 1140.02 10$ Space heating requirements	ains using Mar Ap 96 0.88 = (94)m x 7.71 706.3 1 temperat .5 8.9 nternal ten 39.9 875.5 nt for eacl 4.35 122.	Table 9a r May a 0.71 (84)m 631.7 ure from T 11.7 nperature, 3 a 673.52 n month, k 1 31.11		10.35 6 292.88 16.6 V =[(39)m 9 293.43 ponth = 0.02	Aug 0.4 307.37 16.4 x [(93)m 308.58 24 x [(97 0	Sep 0.69 460.15 14.1 - (96)m 485.84)m - (95	Oct 0.94 524.85 10.6] 735.25)m] x (4 156.54	Nov 0.99 476.52 7.1 969.64 1)m 355.04	Dec 1 453.7 4.2 1167.74 531.25	culate	(95) (96)

9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
	e heatir	-			, .									
						mentary	v system		(201)				0	(201)
				nain syst				(202) = 1 -		(202)]			1	(202)
			•	main sys				(204) = (20	02) x [1 –	(203)] =			1	(204)
				ing syste			<i></i>						92.7	(206)
Efficie		-		ementar		- ·	r		· · · · · ·			1	0	(208)
0	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	512.14	g require 381.07	284.35	alculate	31.11	0	0	0	0	156.54	355.04	531.25]	
(211)m				00 ÷ (20		Ŭ		Ŭ	Ŭ			001120		(211)
(211)11	552.47	411.08	306.74	131.71	33.56	0	0	0	0	168.86	383	573.08		(211)
		I			I			Tota	l (kWh/yea	ar) =Sum(2	1 211) _{15,1012}	<u> </u>	2560.51	(211)
Space	e heatin	g fuel (s	econdar	y), kWh/	month									
= {[(98)m x (20	01)] } x 1	00 ÷ (20)8)									1	
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		-
								lota	l (kWh/yea	ar) = Sum(2)	215) _{15,1012}	7	0	(215)
	heating		ter (calc	ulated a	hove)									
Cuipui	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		
Effic <mark>ie</mark>	ncy of w	ater hea	iter			7		7					87	(216)
(217) <mark>m=</mark>	<mark>8</mark> 9.01	88.92	88.72	88.24	87.49	87	87	87	87	88.38	88.86	<mark>8</mark> 9.04		(217)
		heating,												
. ,	1 = (64) 193.26	m x 100) ; (217) 177.53	158.14	154.94	137.26	129.97	145.19	145.74	163.83	174.62	187.93		
									I = Sum(2				1938.34	(219)
Annua	al totals									k	Wh/year		kWh/year	
Space	heating	fuel use	ed, main	system	1								2560.51	
Water	heating	fuel use	d										1938.34	7
Electri	city for p	oumps, fa	ans and	electric	keep-ho	t								_
centra	al heatir	ng pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45		(230e)
Total e	electricit	v for the	above. I	kWh/yea	ır			sum	of (230a).	(230g) =			75	(231)
	city for l		,	,									333.64	(232)
		erated b	y PVs										-833.39](233)
			-	ual heat	ing syste	ems inclu	uding mi	cro-CHP)					
							lergy /h/year			kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	
Space	heating	(main s	ystem 1)		(21	1) x			0.2	16	=	553.07	(261)
Space	heating	(second	dary)			(21	5) x			0.5	19	=	0	(263)
Water	heating					(219	9) x			0.2	16	=	418.68	(264)

Space and water heating	(261)	+ (262) + (263) + (26	4) =			971.75	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x		0.519	=	38.93	(267)
Electricity for lighting	(232)	x		0.519	=	173.16	(268)
Energy saving/generation technologies Item 1				0.519	=	-432.53	(269)
Total CO2, kg/year			sum of	(265)(271) =		751.3	(272)
Dwelling CO2 Emission Rate			(272) ÷	- (4) =		9.87	(273)
EI rating (section 14)						92	(274)



			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201	2		Stroma Softwa				Versio	n: 1.0.3.11	
		Pr	operty A	Address:	Arlingto	on 3 Bec	1 MID 76			
Address :										
1. Overall dwelling dime	ensions:									
			Area			Av. He	ight(m)		Volume(m ³	
Ground floor			7	6.1	(1a) x	2	2.3	(2a) =	175.03	(3a)
Total floor area TFA = (1)	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)) 7	6.1	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3c	d)+(3e)+	.(3n) =	175.03	(5)
2. Ventilation rate:										_
		econdary	/	other		total			m ³ per hou	r
Number of chimneys	heating ł	neating 0] + [0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0	」 + -	0	」 <u>「</u>] = 「	0	x	20 =	0	(6b)
Number of intermittent fa		•		•		2	x /	10 =	20	(7a)
Number of passive vents						0	x ·	10 =	0	(7b)
·						0		40 =	-	
Number of flueless gas fi	0 anges per ho	(7c)								
Infiltration due to chimne						20		÷ (5) =	0.11	(8)
If a pressurisation test has b		ed, proceed	to (17), o	otherwise c	ontinue fro	om (9) to ((16)			_
Number of storeys in the Additional infiltration	he dwelling (ns)						(0)	41-0-4	0	(9)
Structural infiltration: 0	25 for steel or timber	frame or (0 35 for	masonr	v constr	uction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corres				•	uction			0	
deducting areas of openin	- · · ·		. /	-1) -1						-
If suspended wooden f		ied) or 0.1	i (seale	a), eise	enter U				0	(12)
If no draught lobby, en Percentage of windows		trippod							0	(13)
Window infiltration	s and doors draught s	inpped		0.25 - [0.2	x (14) ÷ 1	001 =		-	0	(14)
Infiltration rate				(8) + (10) -		1	+ (15) =	·	0	(13)
Air permeability value,	a50 expressed in cut	oic metres				· · · ·		area	4	(17)
If based on air permeabil	• • •		•	•	•		molopo	aiou	0.31	(17)
Air permeability value applie	•					is being u	sed		0.01	
Number of sides sheltere	ed								2	(19)
Shelter factor				(20) = 1 - [0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporat	ting shelter factor			(21) = (18)	x (20) =				0.27	(21)
Infiltration rate modified f	or monthly wind speed	tt								
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4									
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
	<u> </u>	· · · · ·							I	

Adjust	ed infiltra	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m						
	0.34	0.33	0.33	0.29	0.29	0.25	0.25	0.25	0.27	0.29	0.3	0.31			
	ate effec echanica		•	rate for t	he appli	cable ca	se								(23a)
				endix N. (2	23b) = (23a) x Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0		(23a) (23b)
					allowing for					, (,			0		(23c)
			-	-	with hea					2h)m + (23h) 🗙 [1	l – (23c)	_		(200)
(24a)m=					0	0	0					0	. 100]		(24a)
		d mech	I anical ve	I	without	heat rec	coverv (N	L /\\/) (24b	l = (22)	I 2b)m + ()	1 23b)				
(24b)m=		0		0	0	0	0	0	0	0	0	0			(24b)
c) If	whole h	ouse ex	ract ver	ntilation of	or positiv	re input v	/entilatic	n from c	utside						
,					c) = (23b	•				5 × (23b))				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
,					se positiv	•				-					
	<u> </u>		r <u>, ,</u>	r È	b)m othe	,	, 		2b)m² x	0.5]			I		
(24d)m=		0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55			(24d)
				r È	i) or (24b	, ,	, <u> </u>	, ,	<u>, </u>				l		(0.7)
(25)m=	0.56	0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55			(25)
3. He	at l <mark>osse</mark>	s and he	eat loss	paramet	er:										
ELEN		Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value		A X I kJ/K	
Doo <mark>rs</mark>						1.89	×	1.6	=	3.024					(26)
Windo	ws Type	e 1				4.41	x1,	/[1/(1.4)+	0.04] =	5.85	F				(27)
Windo	ws Type	2				4.41	x1/	/[1/(1.4)+	0.04] =	5.85	F				(27)
Windo	ws Type	93				4.41	x1/	/[1/(1.4)+	0.04] =	5.85	5				(27)
Windo	ws Type	e 4				2.52	x1/	/[1/(1.4)+	0.04] =	3.34					(27)
Walls		56.3	36	17.6	4	38.72	2 x	0.17		6.58					(29)
Total a	area of e	L				56.36			I		L		L		(31)
Party v						38.24		0	= [0					(32)
Party f						76.1			I	•			\exists		(32a)
Party of						76.1					L		\dashv		(32b)
* for win	ndows and				indow U-va Is and part	alue calcul	ated using	formula 1	/[(1/U-valı	ie)+0.04] a	L as given in	paragraph	L 1 3.2		(020)
			= S (A x					(26)(30)) + (32) =				30.4	19	(33)
	apacity		•	-,					((28)	(30) + (32	2) + (32a).	(32e) =	12289		(34)
			. ,	- = Cm -	+ TFA) in	ı kJ/m²K			Indica	tive Value	: Medium		250		(35)
For des	ign assess	sments wh		tails of the	constructi			ecisely the	e indicative	e values of	TMP in Ta	able 1f		-	
					using Ap	pendix ł	<						6.0	1	(36)
	-				= 0.15 x (3	-							0.0	-	()
Total f	abric he	at loss							(33) +	(36) =			36.	5	(37)
Ventila	ation hea	at loss ca	alculated	d monthly	y				(38)m	= 0.33 × (25)m x (5)		-		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			

(38)m=	32.23	32.1	31.97	31.37	31.26	30.74	30.74	30.64	30.94	31.26	31.49	31.73		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	68.73	68.6	68.47	67.87	67.76	67.24	67.24	67.14	67.44	67.76	67.99	68.22		
Heat lo	iss para	ameter (H	HLP), W	/m²K						Average = = (39)m ÷		12 /12=	67.87	(39)
(40)m=	0.9	0.9	0.9	0.89	0.89	0.88	0.88	0.88	0.89	0.89	0.89	0.9		
Nhunaha			·							Average =	Sum(40)1	12 /12=	0.89	(40)
NUMDE	Jan	Feb	nth (Tab 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	ter hea	ting ene	rgy requ	irement:								kWh/yea	ar:	
if TF. if TF.	A > 13. A £ 13.	9, N = 1	+ 1.76 x		,	,			,	TFA -13.		38		(42)
			ater usag hot water							se target o		.84		(43)
		-	person pe			-	-			Ū				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	99.92	96.29	92.65	89.02	85.39	81.75	81.75	85.39	89.02	92.65	96.29	99.92		-
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D) Tm / 3600		Total = Su hth (see Ta			1090.04	(44)
(45)m=	148.18	129.6	133.73	116.59	111.87	96.54	89.46	102.65	103.88	121.06	132.15	143.5		
			·							Total = Su	m(45) ₁₁₂ =	-	1429.21	(45)
			ng at point											(40)
(46)m= Water	22.23 storage	19.44 loss:	20.06	17.49	16.78	14.48	13.42	15.4	15.58	18.16	19.82	21.53		(46)
	-) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
	•	•	and no ta		•			· ·						
	vise if no storage		hot wate	er (this ir	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature f	actor fro	m Table	2b								0		(49)
•••			r storage	-				(48) x (49)) =			0		(50)
,			eclared of											(54)
		-	factor fr		e z (kvv	n/litre/da	iy)					0		(51)
	•	from Ta										0		(52)
Tempe	rature f	actor fro	m Table	2b								0		(53)
•••			r storage	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
	. ,	(54) in (8		(au 1	الدير م مو			((50)				0		(55)
	-		culated		1	-	1	((56)m = (1	-			(50)
(56)m= If cylinde	0 er contain:	0 s dedicate	0 d solar sto	0 rage, (57)	0 = (56)m	$0 \times [(50) - ($	0 H11)] - (5)	0), else (5	0 7)m = (56)	0 m where (0 H11) is fro	0 m Appendix	(H	(56)
														(57)
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)

Primar	y circuit	loss cal	culated		month (. ,	65 × (41)				0		(58)
(moo	dified by	factor f	rom Tab	le H5 if t	here is s	olar wat	ter heati	ng and a	cylinde	r thermo	stat)		1	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	23.84	21.5	23.77	22.95	23.68	22.88	23.62	23.66	22.92	23.73	23.02	23.82		(61)
Total h	eat requ	ired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61))m
(62)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		(62)
Solar DH	HW input c	alculated	using App	endix G or	Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditional	lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from wa	ater hea	ter											
(64)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		
			-	-			-	Outp	out from wa	ater heate	r (annual)₁	12	1708.6	(64)
Heat g	ains fror	n water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	55.23	48.47	50.41	44.5	43.12	37.82	35.65	40.05	40.27	46.19	49.69	53.67		(65)
in <mark>clu</mark>	de (57)r	n in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	eating	
5. Int	ernal ga	ins (see	Table {	5 and 5a):									
Metab	olic gain	s (Table	e 5), Wat	ts										
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	119.23	119.23	11 <mark>9.23</mark>	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23		(66)
Lightin	g gains	(calcula	ted in Ar	pendix	L, equat	ion L9 o	r L9a), a	lso see [.]	Table 5					
(67)m=	18.89	16.78	13.65	10.33	7.72	6.52	7.04	9.16	12.29	15.61	18.21	19.42		(67)
Applia	nces gai	ns (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	211.1	213.29	207.77	196.02	181.18	167.24	157.93	155.74	161.26	173.01	187.84	201.78		(68)
Cookir	a aains	(calcula	ted in A	ppendix	L. equat	ion L15	or L15a), also se	e Table	5	1	1		
(69)m=	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92		(69)
	and far	ns dains	ر (Table ؛	1			ļ			ļ	ļ			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
		aporatio	n (nega	ı tive valu	L es) (Tab	le 5)								
(71)m=	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39		(71)
	heating	nains (T		ļ			ļ	ļ		ļ	ļ	<u> </u>		
(72)m=	74.23	72.12	67.75	61.81	57.96	52.53	47.92	53.83	55.93	62.08	69.02	72.14		(72)
	nternal			0.101	01100			n + (68)m +						
(73)m=	365.99	363.96	350.94	329.93	308.63	288.06	274.66	280.49	291.25	312.46	336.84	355.11		(73)
	ar gains		000.04	020.00	000.00	200.00	27 - 1.00	200.40	201.20		000.04			()
			using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	e applicat	ole orientat	ion.		
-	ation: A		-	Area		Flu			g_		FF		Gains	
		abla 6d		m2			hlo 6a	т	abla 6h	т	abla 6c		(\\\)	

Unentation.	Table 6d		m ²		Table 6a		g_ Table 6b		Table 6c		(W)	
Southeast 0.9	x 0.77	x	4.41	x	36.79	x	0.63	x	0.7	=	49.59	(77)
Southeast 0.9	x 0.77	x	4.41	x	62.67	x	0.63	×	0.7	=	84.47	(77)

Southeast 0.9x		Ι	· · · ·	ι		1				1		
L	0.77	x	4.41	X	85.75	×	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	X	4.41	X	106.25	×	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	X	4.41	X	119.01	X	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	X	4.41	X	118.15	×	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	X	4.41	X	113.91	X	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	х	4.41	X	104.39	X	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	x	4.41	x	92.85	X	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	4.41	X	69.27	X	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	x	4.41	x	44.07	×	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	x	4.41	X	31.49	×	0.63	x	0.7	=	42.44	(77)
Southwest _{0.9x}	0.77	x	2.52	x	36.79	ļ	0.63	x	0.7	=	28.34	(79)
Southwest _{0.9x}	0.77	x	2.52	x	62.67		0.63	x	0.7	=	48.27	(79)
Southwest _{0.9x}	0.77	x	2.52	x	85.75		0.63	x	0.7	=	66.04	(79)
Southwest _{0.9x}	0.77	x	2.52	x	106.25		0.63	x	0.7	=	81.83	(79)
Southwest _{0.9x}	0.77	x	2.52	x	119.01		0.63	x	0.7	=	91.66	(79)
Southwest _{0.9x}	0.77	x	2.52	x	118.15		0.63	x	0.7	=	90.99	(79)
Southwest _{0.9x}	0.77	x	2.52	x	113.91		0.63	x	0.7	=	87.73	(79)
Southwest0.9x	0.77	х	2.52	X	104.39		0.63	x	0.7	=	80.4	(79)
Southwest0.9x	0.77	x	2.52	х	92.85		0.63	x	0.7	=	71.51	(79)
Southwest _{0.9x}	0. <mark>77</mark>	x	2.52	x	69.27		0.63	x	0.7	=	53.35	(79)
Southwest _{0.9x}	0.7 <mark>7</mark>	x	2.52	x	44.07		0.63	x	0.7	=	33.94	(79)
Southwest _{0.9x}	0.77	x	2.52	x	31.49		0.63	x	0.7	=	24.25	(79)
Northwest 0.9x	0.77	x	4.41	x	11.28	×	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	11.28	×	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	x	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	×	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	×	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	×	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	×	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	×	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	×	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	×	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	×	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	x	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	91.1	×	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	x	4.41	x	91.1	x	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	x	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	x	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	x	4.41	x	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	x	4.41	x	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	x	4.41	x	28.07	x	0.85	x	0.7	=	51.04	(81)

Northwest 0, 0, 0.77 × 4.41 × 28.07 × 0.05 × 0.7 = 51.04 (9) Northwest 0, 0x 0.77 × 4.41 × 14.2 × 0.055 × 0.77 = 51.04 (9) Northwest 0, 0x 0.77 × 4.41 × 0.21 × 0.055 × 0.77 = 51.04 (9) Northwest 0, 0x 0.77 × 4.41 × 0.21 × 0.055 × 0.77 = 16.76 (9) Northwest 0, 0x 0.77 × 4.41 × 0.21 × 0.055 × 0.77 = 16.76 (9) Northwest 0, 0x 0.77 × 4.41 × 0.21 × 0.055 × 0.77 = 16.76 (9) Northwest 0, 0x 0.77 x 4.41 × 0.21 x 0.055 × 0.77 1.02 10.02 10.02 10.02 10.02 10.02 10.02 10.02 10.02 <th>Northwest 0.9x</th> <th></th> <th></th> <th>-</th> <th></th>	Northwest 0.9x			-													
Northwest 0.8. 0.77 × 4.41 × 4.42 × 0.05 × 0.7 = 25.82 (n1) Northwest 0.8. 0.77 × 4.41 × 2.1 × 0.85 × 0.7 = 25.82 (n1) Northwest 0.8. 0.77 × 4.41 × 2.1 × 0.85 × 0.7 = 16.76 (n1) Northwest 0.8. 0.77 × 4.41 × 2.1 × 0.85 × 0.7 = 16.76 (n1) Northwest 0.8. 0.77 × 4.41 × 2.1 × 0.85 × 0.7 = 16.76 (n1) Northwest 0.8. 0.77 × 4.41 × 2.1 × 0.81 × 0.77 = 16.76 (n1) Solar gains in walts, calculated for each month (19) = \$\$\u00ed \$\u00ed\$ \$\$\u00ed\$	Northwest $_{0.9x}$ $_{0.77}$ x $_{4.41}$ x $_{14.2}$ x $_{0.85}$ x $_{0.7}$ = $_{25.82}$ (81)														(81)		
Northwest 0.34 0.77 × 4.41 × 92.1 × 0.25 × 0.7 = 16.76 (81) Northwest 0.94 0.77 × 4.41 × 92.1 × 0.25 × 0.7 = 16.76 (81) Northwest 0.94 0.77 × 4.41 × 92.1 × 0.25 × 0.7 = 16.76 (81) Solar gains in watts, calculated for each month (83)m = Sum(74)m(62)m (83)m = 11.868 210.28 323. 472.17 594.28 0.44 572.05 485.22 390.02 248.78 144.97 100.2 (83) Total gains - internal and solar (84)m = (73)m + (83)m, watts (84)m = 44.45 580.4 82.2 1892.48 32.4 982.49 842.5 87.22 65.71 671.27 561.24 451.61 455.31 (44) 7. Mean internal temporature (heating beating periods in the living area from Table 9. Th1 (°C) 21 (86) Utilisation factor for gains for living area, h1.m (see Table 9a) (86)m $1 0.99 0.97 0.87 0.82 0.48 0.48 0.35 0.4 0.67 0.94 0.99 1 1 (86) Mean internal temporature in living area 11 (follow steps 3 to 7 in Table 9c) (87)m 20.14 20.32 20.57 20.8 20.97 21 21 21 20.98 20.17 20.4 20.1 (87) Temperature during heating periods in rest of dwelling from Table 9. Th1 (°C) Utilisation factor for gains for living area 11 (follow steps 3 to 7 in Table 9c) (87)m 20.14 20.17 20.17 20.17 20.17 (87) Utilisation factor for gains for lives of dwelling 1001 8 0.18 20.18 20.17 20.1 (87) Temperature during heating periods in rest of dwelling 1001 8 0.18 20.18 20.18 20.17 20.1 (87) Utilisation factor for gains for lives of dwelling 12 (follow steps 3 to 7 in Table 9c) (89)m 1 0.99 0.96 0.88 0.83 0.42 0.45 0.43 0.42 0.43 10.8 20.18 20.19 (93) (89)m 1 0.91 10.92 10.92 10.92 10.92 10.92 10.92 10.92 10.93 (93) (90)m 10.30 10.91 10.94 20.28 20.42 20.45 20.$	Northwest 0.9x	0.77	x	4.4	41	x		14.2	x	0.85	x	0.7	=	25.82	(81)		
Northwest $0.95 \\ 0.77$	Northwest 0.9x	0.77	x	4.4	11	x		14.2	x	0.85	x	0.7	=	25.82	(81)		
Solar gains in watts, calculated for each month (8)m = Sum(74)m(82)m (3)m = 118.56 118.56 126.26 332.1 472.17 584.26 684.4 572.56 485.22 300.02 248.78 144.97 100.2 (63) Total gains - internal and solar (64)m = (73)m + (83)m, watts (64)m 484.95 580.22 683.04 822.1 892.46 847.22 765.71 671.27 561.24 481.81 455.31 (44) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9. Th1 (*C) 21 (65) (16)m 1 0.89 0.87 0.87 0.48 0.35 0.4 0.67 0.49 0.99 (66) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (77) 20.1 (77) (77) 20.1 (77) (71) (77) (87) (16)m 1 0.90 0.87 0.42 0.21 20.17 20.4 20.17 (70) (72) (87) (17)m 20.17 20.17 20.18	Northwest 0.9x	0.77	x	4.4	41	x	ģ	9.21	x	0.85	x	0.7	=	16.76	(81)		
(83)me 118.86 216.26 332.1 472.17 584.28 60.4 572.56 485.22 380.02 248.78 144.97 100.2 (63) Total gains - internal and solar (84)me (73)m + (83)m, watts (84)me 484.95 580.22 683.04 892.45 887.22 766.71 671.27 561.24 461.81 456.31 (64) (84)me 484.95 580.22 683.04 892.45 887.22 766.71 671.27 561.24 461.81 456.31 (65) Temperature during heating periods in the living area, h1,m (see Table 9a) Utilisation factor for gains for living area, h1,m (see Table 9a) (66) Using area, h1,m (see Table 9a) (80)me 20.14 20.32 20.57 20.44 20.97 21 21 20.88 20.17 20.17 20.1 (67) (80)me 20.16 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.18 20.18	Northwest 0.9x	0.77	x	4.4	11	x	ę	9.21	x	0.85	x [0.7	=	16.76	(81)		
(83)me 118.86 216.26 332.1 472.17 584.28 60.4 572.56 485.22 380.02 248.78 144.97 100.2 (63) Total gains - internal and solar (84)me (73)m + (83)m, watts (84)me 484.95 580.22 683.04 892.45 887.22 766.71 671.27 561.24 461.81 456.31 (64) (84)me 484.95 580.22 683.04 892.45 887.22 766.71 671.27 561.24 461.81 456.31 (65) Temperature during heating periods in the living area, h1,m (see Table 9a) Utilisation factor for gains for living area, h1,m (see Table 9a) (66) Using area, h1,m (see Table 9a) (80)me 20.14 20.32 20.57 20.44 20.97 21 21 20.88 20.17 20.17 20.1 (67) (80)me 20.16 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.17 20.18 20.18																	
Total gains - Internal and Solar (84)m = (73)m + (83)m, watts (44)m (44.95) 580.22 683.04 802.1 892.89 892.45 847.22 765.71 671.27 561.24 481.81 455.31 (44) 7 Mean internal temporature (heating season) Total gains for living area. If, m (see Table 9a) (80)m= 1 0.99 0.87 0.68 0.48 0.35 0.4 0.57 0.94 0.99 1 (66) (80)m= 1 0.99 0.87 0.68 0.48 0.35 0.4 0.57 0.94 0.99 1 (66) Main internal temporature in living area. If (follow steps 3 to 7 in Table 9c) (67)	Solar <u>g</u> ains in	watts, calcu	lated	for eac	h month				(83)m = S	um(74)m .	(82)m						
(B4)m= 484.85 58.022 882.04 892.1 882.88 892.45 847.22 765.71 671.27 561.24 481.81 465.31 (4) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains tor living area, h1,m (see Table 9a) (80)m= 1 0.99 0.97 0.87 0.84 0.35 0.4 0.57 0.94 0.99 1 (85) Mar Apr May Jun Jul Aug Sep Oct Nov Dec (87)m= 0.14 20.32 20.57 20.84 20.97 21 21 21 20.98 20.77 20.4 20.1 (77) Temperature during heating periods in rest of dwelling, h2/m (see Table 9a) (89) (485.22	380.02	248.78	144.97	100.2		(83)		
7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (80)m= 1 0.99 0.87 0.88 0.44 0.97 0.88 0.48 0.48 0.49 0.07 0.01 (80)m= 20.14 20.32 20.57 20.84 20.17 <td 2"2"2"2"2"2"2"2"2"2"2"2"2"2"2"2"2"2<="" colspan="2" td=""><td>Total gains – i</td><td>nternal and</td><td>solar</td><td>(84)m =</td><td>= (73)m</td><td>+ (8</td><td>83)m</td><td>, watts</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td>	<td>Total gains – i</td> <td>nternal and</td> <td>solar</td> <td>(84)m =</td> <td>= (73)m</td> <td>+ (8</td> <td>83)m</td> <td>, watts</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Total gains – i	nternal and	solar	(84)m =	= (73)m	+ (8	83)m	, watts							
Temperature during heating periods in the living area from Table 9, Th1 (*C) 21 (65) Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86) (80)me 1 0.99 0.97 0.87 0.68 0.48 0.35 0.4 0.57 0.04 0.90 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (67) (67) Temperature during heating periods in rest of dwelling from Table 9, Th2 (*C) (89	(84)m= 484.95	580.22 68	3.04	802.1	892.89	89	92.45	847.22	765.71	671.27	561.24	481.81	455.31		(84)		
Utilisation factor for gains for living area, h1,m (see Table 9a) (86)me 1 0.99 0.97 0.87 0.68 0.48 0.35 0.4 0.67 0.94 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87) (87)me 20.44 20.32 20.57 20.44 20.97 21 21 21 21 20.4 20.1 (87) Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" (87) Colspan="2">Colspan="2" 20.17 20.17 20.17 20.17 (87) Colspan="2">Colspan="2">Colspan="2" 20.18 20.18 20.18 20.18 20.18 20.17 20.17 (87) (89)me 1 0.99 0.86 0.84 0.83 0.42 0.28 0.33 0.6 0.99 1 (89) Utilisation factor for gains for rest of dwelling 12 (follow steps 3 to 7 in Table 9c) (90) (90) 1.9.21 19.27 19.32 18.97 (91) (7. Mean inter	rnal tempera	ture ((heating	seasor	า)											
$ \begin{array}{c} \begin{array}{c} \begin{array}{c} Jan & Feb & Mar & Apr & May & Jun & Jul & Aug & Sep & Oct & Nov & Dec \\ \hline 1 & 0.99 & 0.97 & 0.87 & 0.68 & 0.48 & 0.36 & 0.4 & 0.67 & 0.94 & 0.99 & 1 \\ \hline 1 & 0.99 & 0.97 & 0.87 & 0.68 & 0.48 & 0.36 & 0.4 & 0.67 & 0.94 & 0.99 & 1 \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \hline \end{array} \\ \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} 0.14 & 20.32 & 20.57 & 20.44 & 20.97 & 21 & 21 & 21 & 21 & 20.88 & 20.77 & 20.4 & 20.11 \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} 0.98 & 0.64 & 0.68 & 0.48 & 0.08 & 20.18 & 20.18 & 20.18 & 20.18 & 20.17 & 20.17 \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} 0.91 & 0.99 & 0.96 & 0.64 & 0.63 & 0.42 & 0.28 & 0.33 & 0.6 & 0.92 & 0.99 & 1 \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} (gr)_{m} \end{array} \\ \end{array} \\ \end{array} \\ \hline \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} 0.99 & 0.96 & 0.64 & 0.63 & 0.42 & 0.28 & 0.018 & 20.18 & 20.18 & 20.18 & 20.18 & 20.18 & 20.19 & 19.27 \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} $ \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \end{array} \\ \end{array} \end{array} \\ \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \end{array} \\ \end{array} \end{array} \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \end{array} \\ \\ \end{array} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \bigg \\ \bigg \\ \\ \end{array} \\ \end{array} \\ \\ \end{array} \\ \bigg \\ \bigg \\ \\ \end{array} \\ \bigg \bigg \\ \end{array} \\ \bigg \\ \bigg	Temperature	during heat	ing pe	eriods ir	n the livi	ng	area f	from Tab	ole 9, Th	1 (°C)				21	(85)		
(86)m= 1 0.99 0.97 0.87 0.88 0.48 0.35 0.4 0.67 0.94 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.14 20.32 20.57 20.84 20.97 21 21 21 20.98 20.77 20.4 20.1 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (89)m= 20.17 20.17 20.17 20.17 20.18 20.18 20.18 20.18 20.17 20.17 (87) Utilisation factor for gains for rest of dwelling, h2 m (see Table 9a) (89) (80) (81) (89) (81) (81) (81) (81) (81) (81) (81) (81) (81)	Utilisation fac	ctor for gains	for li	iving are	ea, h1,m	า (s	ee Ta	ble 9a)									
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9C) (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (87) (89) 20.16 20.17 20.	Jan	Feb M	/lar	Apr	May	Ì	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
	(86)m= 1	0.99 0.	.97	0.87	0.68	(0.48	0.35	0.4	0.67	0.94	0.99	1		(86)		
	Mean interna	l temperatur	in l	ivina ar	og T1 (f	مالم	w sta	ns 3 to 7	' in Tahl					1			
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (Bym		<u> </u>	1	-	r ·			i		<u> </u>	20.77	20.4	20.1		(87)		
(88)mL 20.16 20.17 20.17 20.17 20.18 20.18 20.18 20.18 20.18 20.17 20.17 20.17 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)mL 1 0.99 0.96 0.84 0.63 0.42 0.28 0.33 0.6 0.82 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (90) (LA = Living area ÷ (4) = 0.33 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92) (93) (94) (94) (92) (93)me 19.91 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) 8. Sace heating requirement (93) 8. Sace heating requirement (94) Utilisation factor for gains, hm: (94) Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94) UsefU gains, hmGm, W = (94)m x (84)m (95) (96)m 482.48 571.8 65.8.9 <td>. ,</td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td>20111</td> <td></td> <td></td> <td>l</td> <td></td>	. ,					<u> </u>					20111			l			
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89) (89)me 1 0.99 0.96 0.84 0.63 0.42 0.28 0.33 0.6 0.92 0.99 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90) (1.4 = Living area ÷ (4) = 0.33 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92) (93) (94) (94) (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92) (93) (94) (94) (92)me 19.39 19.61 19.94 20.28 20.42 20.45 20.43 20.2 19.72 19.34 (92) (93)me 19.39 19.61 19.94 20.28 20.42 20.45 20.43 20.2 19.72 19.34 (93) Starts for gains using Table 9a (93) (94) 20.28 20.42 20.45 20.43 20.2 19.72 19.34 (93) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94) <td< td=""><td></td><td></td><td><u> </u></td><td></td><td>i</td><td></td><td></td><td>· · · · ·</td><td></td><td></td><td>20.40</td><td>00.47</td><td>00.47</td><td></td><td>(99)</td></td<>			<u> </u>		i			· · · · ·			20.40	00.47	00.47		(99)		
$ \begin{array}{c} (89)m= \hline 1 & 0.99 & 0.96 & 0.84 & 0.63 & 0.42 & 0.28 & 0.33 & 0.6 & 0.92 & 0.99 & 1 \\ \hline Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) \\ (90)m= \hline 19.02 & 19.27 & 19.63 & 20 & 20.15 & 20.18 & 20.18 & 20.18 & 20.18 & 19.92 & 19.39 & 18.97 \\ \hline (90)m= \hline 19.02 & 19.27 & 19.63 & 20 & 20.15 & 20.18 & 20.18 & 20.18 & 19.92 & 19.39 & 18.97 \\ \hline (90)m= \hline 19.02 & 19.27 & 19.63 & 20 & 20.15 & 20.18 & 20.18 & 20.18 & 20.2 & 19.72 \\ \hline (92)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (92)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (93)m= \hline 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ \hline (94)m= \hline 0.99 & 0.99 & 0.95 & 0.84 & 0.64 & 0.44 & 0.31 & 0.35 & 0.62 & 0.92 & 0.99 & 1 & (94) \\ \hline Utilisation factor for gains, hm: \\ \hline (94)m= \hline 0.99 & 0.99 & 0.95 & 0.84 & 0.64 & 0.44 & 0.31 & 0.35 & 0.62 & 0.92 & 0.99 & 1 & (94) \\ \hline Useful gains, hmGm, W = (94)m x (84)m \\ \hline (95)m= \hline (43.4 & 4.9 & 6.5 & 8.9 & 11.7 & 14.6 & 16.6 & 16.4 & 14.1 & 10.6 & 7.1 & 4.2 & (96) \\ \hline Heat loss rate for mean internal temperature from Table 8 \\ \hline (96)m= \hline 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) \\ \hline For logar 100.928 & 90.27 & 772.16 & 50.79 & 393.32 & 258.88 & 271.97 & 427.05 & 650.39 & 858.09 & 1032.92 & (97) \\ \hline Space heating requiremen$	(88)m= 20.16	20.17 20	.17	20.17	20.18	2	0.18	20.18	20.18	20.18	20.18	20.17	20.17		(00)		
$\begin{array}{c} \text{Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)} \\ (90)\text{m} = \begin{array}{c} 19.02 & 19.27 & 19.63 & 20 & 20.15 & 20.18 & 20.18 & 20.18 & 20.18 & 19.92 & 19.39 & 18.97 \\ (90)\text{m} = \begin{array}{c} 19.02 & 19.27 & 19.63 & 20 & 20.15 & 20.18 & 20.18 & 20.18 & 20.18 & 19.92 & 19.39 & 18.97 \\ (164)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (92)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (92)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 20.28 & 10.44 & 0.31 & 0.35 & 0.62 & 0.92 & 19.72 & 19.34 \\ (93)\text{m} = \begin{array}{c} 19.39 & 19.61 & 19.94 & 0.28 & 571.8 & 651.05 & 677 & 574.51 & 391.89 & 258.77 & 271.69 & 417.38 & 514.08 & 475.76 & 453.67 \\ (95)\text{m} = \begin{array}{c} 43.4.9 & 6.5 & 8.9 & 11.7 & 14.6 & 16.6 & 16.4 & 14.1 & 10.6 & 7.1 & 4.2 \\ (96)\text{m} = \begin{array}{c} 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)\text{m} = \begin{array}{c} 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)\text{m} = \begin{array}{c} 10.36.79 & 1009.26 & 920.27 & 772.16 & 90.$			T	est of d	welling,	h2,	m (se		9a)								
$ \begin{array}{c} (30)m = & 19.02 & 19.27 & 19.63 & 20 & 20.16 & 20.18 & 20.18 & 20.18 & 20.18 & 19.92 & 19.39 & 18.97 & (90) \\ \hline \mbox{ILA} = Living area + (4) = & 0.33 & (91) \\ \hline \mbox{ILA} = Living area + (4) = & 0.33 & (91) \\ \hline \mbox{ILA} = Living area + (4) = & 0.33 & (91) \\ \hline \mbox{Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 & (92)m = & 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 & (92) \\ \hline \mbox{Apply adjustment to the mean internal temperature from Table 4e, where appropriate & (93)m = & 19.39 & 19.61 & 19.94 & 20.28 & 20.42 & 20.45 & 20.45 & 20.45 & 20.43 & 20.2 & 19.72 & 19.34 & (93) \\ \hline \mbox{S Space heating requirement} \\ \hline \mbox{S St Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains, hm: \\ \hline \mbox{Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec} \\ \hline \mbox{Utilisation factor for gains, hm: \\ \hline \mbox{(94)m} = & 0.99 & 0.99 & 0.95 & 0.84 & 0.64 & 0.44 & 0.31 & 0.35 & 0.62 & 0.92 & 0.99 & 1 & (94) \\ \hline \mbox{Useful gains, hmGm, W = (94)m x (84)m } \\ \hline \mbox{(95)m} = & 482.48 & 571.8 & 651.05 & 677 & 574.51 & 391.89 & 258.77 & 271.69 & 417.38 & 514.08 & 475.76 & 453.67 & (95) \\ \hline \mbox{Monthly average external temperature from Table 8 } \\ \hline \mbox{(96)m} = & 43.4.9 & 6.5 & 8.9 & 11.7 & 14.6 & 16.6 & 16.4 & 14.1 & 10.6 & 7.1 & 4.2 & (96) \\ \hline Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] & (97) \\ \hline \mbox{Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m & (98)m \\ \hline \mbox{Monthly average quirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m & (98)m & 174.98 & (98) \\ \hline \mbox{Moat by a loss of the case month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m & (98)m & 174.98 & 19.9.18 & 10.142 & 275.28 & 430.97 & 101.422 & 275.28 & 430.97 & 101.422 & 275.28 & 430.97 & 101.422 & 275.28 & 430.97 & 101.422 & 275.28 & 430.97 & 101.422 & 275.28 & 430.97 & 101.422 & 275.28 & 430.9$	(89)m= 1	0.99 0.	96	0.84	0.63	(0.42	0.28	0.33	0.6	0.92	0.99	1		(89)		
ILA = Living area \div (4) = 0.33 (91) Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92) (92)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93) (93) (93) (93) Statisation factor for gains using Table 9a (93) (94) (93) (94) (93) Uilisation factor for gains, hm: (94) (94) (94) (95) (94) (94) Useful gains, hmGm, W = (94)m x (84)m (95) (95) (94) (94) (95) (94) (94) (95)m= 482.48 571.8 651.05 677 574.51 391.89 258.77 271.69 417.38 514.08 475.76 453.67 (95) Monthly average external temperature from Table 8 (96) (96) (96) (97) (97) (96) (97) (97) (96) (97) (97) (96) (97) (97) (96) (98) (98) <td>Me<mark>an int</mark>erna</td> <td>al temp<mark>eratu</mark>r</td> <td>e in t</td> <td>he r<mark>est</mark></td> <td>of dwell</td> <td>ing</td> <td>T2 (fe</td> <td>ollow ste</td> <td>ps 3 to</td> <td>7 in Tabl</td> <td>e 9<mark>c)</mark></td> <td></td> <td>-</td> <td></td> <td></td>	Me <mark>an int</mark> erna	al temp <mark>eratu</mark> r	e in t	he r <mark>est</mark>	of dwell	ing	T2 (fe	ollow ste	ps 3 to	7 in Tabl	e 9 <mark>c)</mark>		-				
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (93) Bayes of the mean internal temperature from Table 4e, where appropriate (93)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (93) Bayes of the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a (94) (94)m (95)m (95) (94) (94)m <t< b=""></t<>	(90)m= 19.02	19.27 19	.63	20	20.15	2	0.18	20.18	20.18	20.16	19.92	19.39	18.97		(90)		
(92)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 19.39 19.61 19.94 20.28 20.42 20.45 20.45 20.43 20.2 19.72 19.34 (93) Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.99 0.95 0.84 0.64 0.44 0.31 0.35 0.62 0.92 0.99 1 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m= 482.48 571.8 651.05 677 574.51 391.89 258.77 271.69 417.38 514.08 475.76 453.67 (95) Monthly average external temperature from Table 8 (96)m = (96)m = (97)m = (93.77 772.16 590.										f	LA = Livir	ig area ÷ (4	4) =	0.33	(91)		
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	 (92)m= 19.39 Apply adjustr (93)m= 19.39 8. Space heat Set Ti to the the utilisation factor (94)m= 0.99 Useful gains (95)m= 482.48 Monthly aver (96)m= 4.3 Heat loss rat (97)m= 1036.79 Space heating 	19.6119ment to the r19.6119ating requiremean internafactor for gainsfactor for gains0.9900.9900.990571.865age externa4.96e for mean in1009.2692ng requirement	$\begin{array}{c c} 1.94 \\ 1.94 \\ 1.94 \\ 1.94 \\ 1.05 \\ $	20.28 interna 20.28 nperatur using Ta Apr 0.84 c)m x (8 677 perature 8.9 al tempo 772.16 r each n	20.42 I temper 20.42 re obtain able 9a May 0.64 4)m 574.51 e from T 11.7 erature, 590.79 nonth, k	2 ratu 2 ned 3 3 able Lm 3	20.45 re fro 20.45 at ste Jun 0.44 91.89 e 8 14.6 1, W = 93.22 /mon1	20.45 m Table 20.45 ep 11 of Jul 0.31 258.77 16.6 =[(39)m 2 258.88 th = 0.02	20.45 4e, who 20.45 Table 9 Aug 0.35 271.69 16.4 x [(93)m 271.97 4 x [(97	20.43 ere appro 20.43 b, so tha Sep 0.62 417.38 14.1 - (96)m 427.05)m - (95	ppriate 20.2 t Ti,m=(Oct 0.92 514.08 10.6] 650.39)m] x (4	19.72 76)m an Nov 0.99 475.76 7.1 858.09 1)m	19.34 d re-calo Dec 1 453.67 4.2 1032.92	 culate 	(93) (94) (95) (96)		
Space heating requirement in kWh/m²/year23.59(99)	 (92)m= 19.39 Apply adjustr (93)m= 19.39 8. Space heat Set Ti to the the utilisation factor (94)m= 0.99 Useful gains (95)m= 482.48 Monthly aver (96)m= 4.3 Heat loss rat (97)m= 1036.79 Space heating 	19.6119ment to the r19.6119ating requiremean internafactor for gainsfactor for gains0.9900.9900.990571.865age externa4.96e for mean in1009.2692ng requirement	$\begin{array}{c c} 1.94 \\ 1.94 \\ 1.94 \\ 1.94 \\ 1.05 \\ $	20.28 interna 20.28 nperatur using Ta Apr 0.84 c)m x (8 677 perature 8.9 al tempo 772.16 r each n	20.42 I temper 20.42 re obtain able 9a May 0.64 4)m 574.51 e from T 11.7 erature, 590.79 nonth, k	2 ratu 2 ned 3 3 able Lm 3	20.45 re fro 20.45 at ste Jun 0.44 91.89 e 8 14.6 1, W = 93.22 /mon1	20.45 m Table 20.45 ep 11 of Jul 0.31 258.77 16.6 =[(39)m 2 258.88 th = 0.02	20.45 4e, who 20.45 Table 9 Aug 0.35 271.69 16.4 < [(93)m 271.97 4 x [(97 0	20.43 ere appro 20.43 b, so tha Sep 0.62 417.38 14.1 - (96)m 427.05)m - (95 0	ppriate 20.2 t Ti,m=(Oct 0.92 514.08 10.6] 650.39)m] x (4 101.42	19.72 76)m an Nov 0.99 475.76 7.1 858.09 1)m 275.28	19.34 d re-calo Dec 1 453.67 4.2 1032.92 430.97	 	(93) (94) (95) (96) (97)		
	(92)m= 19.39 Apply adjustr (93)m= 19.39 8. Space heat Set Ti to the the utilisation Utilisation fac (94)m= 0.99 Useful gains, (95)m= 482.48 Monthly aver (96)m= 4.3 Heat loss rat (97)m= 1036.79 Space heatin (98)m= 412.41	19.6119ment to the r19.6119ating requirermean internafactor for gainsfactor for gains0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.0.990.1009.26920.93.9720	$\begin{array}{c c} 1.94 \\ \hline nean \\ 0.94 \\ \hline nent \\ al tem \\ ains \\ 0.4 \\ \hline 0.5 \\ \hline 0.27 \\ \hline 0.3 \\ \hline 0.3 \\ \hline 0.94	20.28 interna 20.28 nperatur using Ta Apr 0.84 0.84 0.84 0.84 0.84 0.84 0.84 0.84	20.42 I temper 20.42 re obtain able 9a May 0.64 4)m 574.51 e from T 11.7 erature, 590.79 nonth, k 12.11	2 ratu 2 ned 3 3 able Lm 3	20.45 re fro 20.45 at ste Jun 0.44 91.89 e 8 14.6 1, W = 93.22 /mon1	20.45 m Table 20.45 ep 11 of Jul 0.31 258.77 16.6 =[(39)m 2 258.88 th = 0.02	20.45 4e, who 20.45 Table 9 Aug 0.35 271.69 16.4 < [(93)m 271.97 4 x [(97 0	20.43 ere appro 20.43 b, so tha Sep 0.62 417.38 14.1 - (96)m 427.05)m - (95 0	ppriate 20.2 t Ti,m=(Oct 0.92 514.08 10.6] 650.39)m] x (4 101.42	19.72 76)m an Nov 0.99 475.76 7.1 858.09 1)m 275.28	19.34 d re-calo Dec 1 453.67 4.2 1032.92 430.97	 	(93) (94) (95) (96) (97) (98)		

9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	HP)					
•	e heatir	•	4 fm									1		
	•			econdar		mentary		(202) = 1 -	_ (201) _				0	(201)
	•			nain syst				(202) = 1 - (204) =		(203)] -			1	(202)
			•	main sys				(201) - (20	-/ ^ [' '				1 92.7	(204)
	•			ementar		n svetan	n %						92.7	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	_
Space				alculate	· ·		Jui	Aug	Sep	UCI	INOV	Dec	KVVII/yea	11
-1	412.41	293.97	200.3	68.52	12.11	0	0	0	0	101.42	275.28	430.97		
(211)m	n = {[(98)m x (20	94)] } x 1	100 ÷ (20)6)			•						(211)
	444.88	317.12	216.08	73.91	13.06	0	0	0	0	109.4	296.96	464.9		_
								Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	1936.33	(211)
•				y), kWh/	month									
= {[(98 (215)m=	· · · · ·	01)]}x1	00÷(20	0	0	0	0	0	0	0	0	0		
< - /	_							Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water	heating	1												1
Output				ulated a										
Efficier	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33	07	
(217)m=		ater hea 88.76	88.49	87.87	87.22	87	87	87	87	88.09	88.71	<mark>8</mark> 8.93	87	(216) (217)
· · ·		heating,			07.22	07	07	07	07	88.09	00.71	00.93		(217)
(219 <mark>)</mark> m	<u> = (64)</u>	<u>m x 100</u>		<u>)m</u>										
(219)m=	193.52	170.23	177.98	158.81	155.43	137.26	129.97	145.19	145.74	164.36	174.92	188.16		-
•								lota	I = Sum(2 [^]		A/I. /	_	1941.57	(219)
	I totals heating	fuel use	ed, main	system	1					K	Wh/year		kWh/year 1936.33	1
	•	fuel use		,									1941.57	1
Electri	city for p	oumps, fa	ans and	electric	keep-ho	t						l		4
centra	al heatir	g pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45		(230e)
Total e	electricity	/ for the	above,	kWh/yea	ır			sum	of (230a).	(230g) =			75	(231)
Electri	city for li	ghting											333.64	(232)
Electri	city gen	erated b	y PVs										-833.39	(233)
12a. (CO2 em	issions -	– Individ	ual heat	ing syste	ems inclu	uding mi	cro-CHP)					
							ergy /h/year			Emiss kg CO2	ion fac	tor	Emissions kg CO2/yea	ır
Space	heating	(main s	vstem 1)			1) x			0.2		=	418.25	, (261)
	•	(second		,			5) x			0.2		=	0	(263)
	heating		- /			(21	9) x			0.2		=	419.38] (264)

Space and water heating	(261) -	+ (262) + (263) + (264	4) =			837.63	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x		0.519	=	38.93	(267)
Electricity for lighting	(232)	x		0.519	=	173.16	(268)
Energy saving/generation technologies Item 1				0.519	=	-432.53	(269)
Total CO2, kg/year			sum of	(265)(271) =		617.18	(272)
Dwelling CO2 Emission Rate			(272) ÷	· (4) =		8.11	(273)
EI rating (section 14)						93	(274)



			User D	etails:						
Assessor Name: Software Name:	Stroma FSAP 201	2		Stroma Softwa				Versio	n: 1.0.3.11	
		Pr	operty A	Address:	Arlingto	on 3 Bec	TOP 76	6		
Address :										
1. Overall dwelling dime	nsions:									
			Area			Av. He	ight(m)		Volume(m ³	
Ground floor			7	'6.1	(1a) x	2	2.3	(2a) =	175.03	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e	e)+(1n)) 7	'6.1	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3c	l)+(3e)+	.(3n) =	175.03	(5)
2. Ventilation rate:										
		econdary neating	/	other		total			m ³ per hou	r
Number of chimneys] + [0] = [0	X 4	40 =	0	(6a)
Number of open flues		0	」 +	0	」 = [0	x	20 =	0	(6b)
Number of intermittent fa	ns				」 「	2	x '	10 =	20	(7a)
Number of passive vents						0	x 7	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
					L			Air ch	ange <mark>s per</mark> ho	
Infiltration due to chimne						20		÷ (5) =	0.11	(8)
If a pressurisation test has b		ed, proceed	to (17), o	otherwise c	ontinue fro	om (9) to ((16)			_
Number of storeys in the Additional infiltration	he dwelling (ns)						(0)	41-0-4	0	(9)
Structural infiltration: 0	25 for steel or timber	frame or	0 35 for	masonr	v constr	uction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corres				•	uction		l	0	
deducting areas of openir										_
If suspended wooden f		ed) or 0. ⁻	1 (seale	d), else	enter 0				0	(12)
If no draught lobby, en									0	(13)
Percentage of windows	s and doors draught si	ripped		0.25 - [0.2	v (14) · 1	001 -			0	(14)
Window infiltration				(8) + (10) -		1	(15) -		0	(15)
Infiltration rate						· · · ·			0	(16)
Air permeability value, If based on air permeabil			•	•	•	etre of e	envelope	area	4	(17)
Air permeability value applie						is heina u	sod	l	0.31	(18)
Number of sides sheltere			o a a ag		mousinty	o bollig u	500	I	2	(19)
Shelter factor	-			(20) = 1 - [0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporat	ing shelter factor			(21) = (18)	x (20) =				0.27	(21)
Infiltration rate modified f	or monthly wind speed	ł						I		
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Easter (22a) (22a)	2)	f					-			
Wind Factor $(22a)m = (22)$ (22a)m 1.27 1.25	2)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
					•		L			

Adjuste	ed infiltr	ation rat	e (allowi	ing for sh	elter an	d wind s	peed) =	(21a) x	(22a)m					
<u> </u>	0.34	0.33	0.33	0.29	0.29	0.25	0.25	0.25	0.27	0.29	0.3	0.31		
		c <i>tive air</i> al ventila	-	rate for ti	he appli	cable ca	se						0	(23a)
				endix N, (2	3b) = (23a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23b)
				iency in %						, , ,			0	(23c)
			-	entilation	-					2b)m + (23b) x [*	1 – (23c)	-	(200)
(24a)m=		0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	d mech	ı anical ve	entilation	without	heat rec	covery (N	і ЛV) (24b	m = (22)	1 2b)m + (2	23b)			
, (24b)m=	-	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	ntilation c	or positiv	e input v	ventilatic	n from o	outside	1				
i	if (22b)n	n < 0.5 >	(23b), t	hen (24c	c) = (23b); otherv	wise (24	c) = (22k	o) m + 0.	5 × (23b)	-		
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,				ole hous	•	•				1				
	, <i>,</i>	· · · · · ·	r <u>, ,</u>	m = (22k)		,	, 1		<u> </u>	r -	0.55	0.55		(24d)
(24d)m=		0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(240)
(25)m=	0.56	cnange 0.56	rate - er 0.55	nter (24a) or (240 0.54	0.53 or (240	c) or (24 0.53	d) in box	0.54	0.54	0.55	0.55	l	(25)
(23)11=	0.50	0.50	0.55	0.54	0.54	0.55	0.55	0.55	0.54	0.34	0.55	0.55		(20)
3. He	at losse	s and he	eat loss	paramete	er:									
ELEN		Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value		A X k kJ/K
Doors		arca	(111)			1.89		1.6	=	3.024			`	(26)
	ws Type	e 1				4.41		/[1/(1.4)+		5.85	Ħ			(27)
	ws Type					4.41		/[1/(1.4)+		5.85	Ħ			(27)
	ws Type					4.41		/[1/(1.4)+		5.85	4			(27)
	ws Type					2.52	╡.	/[1/(1.4)+	-	3.34				(27)
Walls	wo rype			17.6					= [(29)
Roof		56.3		17.64		38.72		0.17		6.58	╡╏			
	roa of c	elements		0		76.1	×	0.16	=	12.18				(30)
			, 111-			132.4					r			(31)
Party v						38.24	×	0	=	0				(32)
Party f		roof wind	0.000 000 0	effective wil	adow I I va	76.1	atod using	formula 1	/[/1/1/1/04	(0) (0) (0) (0) (0) (0) (0) (0) (0) (0)	L S givon in	naragraph		(32a)
				nternal wall			aleu using	iomula i	/[(1/0-vait	ie)+0.04j d	is given in	parayrapri	5.2	
Fabric	heat los	s, W/K	= S (A x	U)				(26)(30)) + (32) =				42.66	(33)
Heat c	apacity	Cm = S	(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	11452.3	5 (34)
Therm	al mass	parame	eter (TMI	⁻ = Cm ÷	· TFA) in	ı kJ/m²K			Indica	tive Value	: Medium		250	(35)
	•		ere the de tailed calc	tails of the ulation.	constructi	on are not	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Therm	al bridg	es : S (L	x Y) cal	culated u	ising Ap	pendix ł	<						6.01	(36)
			are not kr	own (36) =	: 0.15 x (3	1)								
	abric he									(36) =			48.67	(37)
Ventila		i	i	d monthly				•	· · ·	$= 0.33 \times ($	· · · ·		l	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m=	32.23	32.1	31.97	31.37	31.26	30.74	30.74	30.64	30.94	31.26	31.49	31.73		(38)
Heat tr	ansfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	80.9	80.77	80.65	80.05	79.94	79.41	79.41	79.32	79.62	79.94	80.16	80.4		
				/						-	Sum(39)1	12 /12=	80.05	(39)
		r ·	HLP), W/	· · · · · ·	4.05	4.04	4.04	4.04		= (39)m ÷	1	4.00		
(40)m=	1.06	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.05	1.05	1.05 Sum(40) ₁	1.06	1.05	(40)
Numbe	er of day	/s in mo	nth (Tab	le 1a)					,	-verage -	Curr(+0)1	12712-	1.00	
	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	ter hea	ting ene	rgy requ	irement:								kWh/yea	ar:	
Accum		upancy,	NI											(40)
			+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	- A -13.9)2)] + 0.0)013 x (⁻	TFA -13.		38		(42)
		9, N = 1									·			
			ater usag hot water							se target o		.84		(43)
		-	person pe			-	-			je turget e		_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	<mark>9</mark> 9.92	96.29	92.65	89.02	85.39	81.75	81.75	85.39	89.02	92.65	96.29	<mark>9</mark> 9.92		
											m(44) ₁₁₂ =		1090.04	(44)
Energy o	content of	^t hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D)Tm / 3600) kWh/mor	oth (see Ta	bles 1b, 1	c, 1d)		
(45)m=	148.18	129.6	133.73	116.59	111.87	96.54	89.46	102.65	103.88	121.06	132.15	143.5		
lf instant	aneous v	vater heati	ng at point	of use (no	hot water	r storage).	enter 0 in	boxes (46		Tota <mark>l = S</mark> u	m(45) ₁₁₂ =	=	1429.21	(45)
(46)m=	22.23	19.44	20.06	17.49	16.78	14.48	13.42	15.4	15.58	18.16	19.82	21.53		(46)
· · ·	storage		20.00	17.45	10.70	14.40	10.42	10.4	10.00	10.10	10.02	21.00		()
Storag	e volum	ne (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comr	nunity ł	neating a	and no ta	nk in dw	velling, e	nter 110	litres in	(47)						
			hot wate	er (this ir	icludes i	nstantar	ieous co	mbi boil	ers) ente	er '0' in (47)			
	storage		eclared I	oss fact	or ie kno	wp (k\//k	v/dav/):							(48)
			m Table				i/uay).					0		(48)
			r storage		ar			(48) x (49)	. =			0		(43)
			eclared of	•		or is not		(10) x (10)				0		(50)
		-	factor fr		e 2 (kW	h/litre/da	ıy)					0		(51)
		•	see secti	on 4.3										(50)
		from Ta	on Table	2b								0		(52) (53)
			r storage		ar			(47) x (51)	x (52) x (53) -				(54)
•••		(54) in (5	-	,, y	201			(47) X (01)	(x (02) x (00) -		0		(55)
	. ,	. , .	, culated	for each	month			((56)m = (55) × (41)	m	L			
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
	er contain	s dedicate	l d solar sto	rage, (57)	n = (56)m	x [(50) – (L H11)] ÷ (5	0), else (5	l 7)m = (56)	n where (L H11) is fro	m Appendix	κH	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
		I	I	ļ		I		I		I	L			

Primar	y circuit	loss cal	culated		month (. ,	65 × (41)				0		(58)
(moo	dified by	factor f	rom Tab	le H5 if t	here is s	olar wat	ter heati	ng and a	cylinde	r thermo	stat)		1	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	23.84	21.5	23.77	22.95	23.68	22.88	23.62	23.66	22.92	23.73	23.02	23.82		(61)
Total h	eat requ	ired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61))m
(62)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		(62)
Solar DH	HW input c	alculated	using App	endix G or	Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditional	lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from wa	ater hea	ter											
(64)m=	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33		
			-	-			-	Outp	out from wa	ater heate	r (annual)₁	12	1708.6	(64)
Heat g	ains fror	n water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 >	(46)m	+ (57)m	+ (59)m]	
(65)m=	55.23	48.47	50.41	44.5	43.12	37.82	35.65	40.05	40.27	46.19	49.69	53.67		(65)
in <mark>clu</mark>	de (57)r	n in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ate <mark>r is f</mark> r	om com	munity h	eating	
5. Int	ernal ga	ins (see	Table {	5 and 5a):									
Metab	olic gain	s (Table	e 5), Wat	ts										
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	119.23	119.23	11 <mark>9.23</mark>	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23	119.23		(66)
Lightin	g gains	(calcula	ted in Ar	pendix	L, equat	ion L9 o	r L9a), a	lso see [.]	Table 5					
(67)m=	18.89	16.78	13.65	10.33	7.72	6.52	7.04	9.16	12.29	15.61	18.21	19.42		(67)
Applia	nces gai	ns (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(68)m=	211.1	213.29	207.77	196.02	181.18	167.24	157.93	155.74	161.26	173.01	187.84	201.78		(68)
Cookir	a aains	(calcula	ted in A	ppendix	L. equat	ion L15	or L15a), also se	e Table	5	1	1		
(69)m=	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92	34.92		(69)
	and far	ns dains	ر (Table ؛	1			ļ				ļ			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
		aporatio	n (nega	ı tive valu	L es) (Tab	le 5)								
(71)m=	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39	-95.39		(71)
	heating	nains (T		ļ			ļ	ļ		ļ	ļ	<u> </u>		
(72)m=	74.23	72.12	67.75	61.81	57.96	52.53	47.92	53.83	55.93	62.08	69.02	72.14		(72)
	nternal			0.101	01100			n + (68)m +						
(73)m=	365.99	363.96	350.94	329.93	308.63	288.06	274.66	280.49	291.25	312.46	336.84	355.11		(73)
	ar gains		000.04	020.00	000.00	200.00	27 - 1.00	200.40	201.20		000.04			()
			using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	e applicat	ole orientat	ion.		
-	ation: A		-	Area		Flu			g_		FF		Gains	
		abla 6d		m2			hlo 6a	т	abla 6h	т	abla 6c		(\\\)	

Unentation.	Table 6d		m ²		Table 6a		g_ Table 6b		Table 6c			
Southeast 0.9	x 0.77	x	4.41	x	36.79	x	0.63	x	0.7	=	49.59	(77)
Southeast 0.9	x 0.77	x	4.41	x	62.67	x	0.63	×	0.7	=	84.47	(77)

Southeast 0.9x		1		۱		1				1		
L	0.77	×	4.41	×	85.75	X	0.63	x	0.7	=	115.57	(77)
Southeast 0.9x	0.77	X	4.41	X	106.25	X	0.63	x	0.7	=	143.2	(77)
Southeast 0.9x	0.77	X	4.41	×	119.01	X	0.63	x	0.7	=	160.4	(77)
Southeast 0.9x	0.77	X	4.41	X	118.15	X	0.63	x	0.7	=	159.24	(77)
Southeast 0.9x	0.77	X	4.41	X	113.91	X	0.63	x	0.7	=	153.52	(77)
Southeast 0.9x	0.77	X	4.41	X	104.39	X	0.63	x	0.7	=	140.69	(77)
Southeast 0.9x	0.77	X	4.41	X	92.85	X	0.63	x	0.7	=	125.14	(77)
Southeast 0.9x	0.77	x	4.41	x	69.27	X	0.63	x	0.7	=	93.36	(77)
Southeast 0.9x	0.77	×	4.41	x	44.07	X	0.63	x	0.7	=	59.4	(77)
Southeast 0.9x	0.77	×	4.41	x	31.49	X	0.63	x	0.7	=	42.44	(77)
Southwest _{0.9x}	0.77	×	2.52	×	36.79	ļ	0.63	x	0.7	=	28.34	(79)
Southwest _{0.9x}	0.77	×	2.52	×	62.67	ļ	0.63	x	0.7	=	48.27	(79)
Southwest _{0.9x}	0.77	x	2.52	x	85.75	ļ	0.63	x	0.7	=	66.04	(79)
Southwest _{0.9x}	0.77	x	2.52	x	106.25		0.63	x	0.7	=	81.83	(79)
Southwest _{0.9x}	0.77	x	2.52	x	119.01		0.63	x	0.7	=	91.66	(79)
Southwest _{0.9x}	0.77	x	2.52	x	118.15		0.63	x	0.7	=	90.99	(79)
Southwest _{0.9x}	0.77	x	2.52	x	113.91		0.63	x	0.7	=	87.73	(79)
Southwest0.9x	0.77	x	2.52	X	104.39		0.63	x	0.7	=	80.4	(79)
Southwest0.9x	0.77	x	2.52	х	92.85		0.63	x	0.7	=	71.51	(79)
Southwest _{0.9x}	0.77	x	2.52	х	69.27		0.63	x	0.7	=	53.35	(79)
Southwest0.9x	0.77	x	2.52	x	44.07		0.63	x	0.7	=	33.94	(79)
Southwest0.9x	0.77	×	2.52	×	31.49]	0.63	x	0.7	=	24.25	(79)
Northwest 0.9x	0.77	x	4.41	x	11.28	×	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	11.28	x	0.85	x	0.7	=	20.52	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	x	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	22.97	x	0.85	x	0.7	=	41.76	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	x	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	41.38	x	0.85	x	0.7	=	75.24	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	x	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	67.96	×	0.85	x	0.7	=	123.57	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	x	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	91.35	x	0.85	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	×	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	97.38	x	0.85	x	0.7	=	177.08	(81)
Northwest 0.9x	0.77	x	4.41	x	91.1	x	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	×	4.41	×	91.1	×	0.85	x	0.7	=	165.66	(81)
Northwest 0.9x	0.77	×	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	×	4.41	x	72.63	×	0.85	x	0.7	=	132.06	(81)
Northwest 0.9x	0.77	×	4.41	×	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	×	4.41	×	50.42	×	0.85	x	0.7	=	91.68	(81)
Northwest 0.9x	0.77	x	4.41	x	28.07	x	0.85	x	0.7	=	51.04	(81)

Northwest 0.9x		-	-											
	0.77	×	4.4	1	× 28.07		x	0.85	×	0.7	=	51.04	(81)	
Northwest 0.9x	0.77	x	4.4	11	x	1	4.2	x	0.85	x	0.7	=	25.82	(81)
Northwest 0.9x	0.77	x	4.4	11	×	1	4.2	x	0.85	x	0.7	=	25.82	(81)
Northwest 0.9x	0.77	×	4.4	11	×	9).21	x	0.85	x	0.7	=	16.76	(81)
Northwest 0.9x	0.77	x	4.4	11	× [9).21	x	0.85	_ x [0.7	=	16.76	(81)
Solar <u>g</u> ains in	watts, calcu	lated	for eac	h month	1			(83)m = S	um(74)m .	(82)m				
(83)m= 118.96	216.26 33	32.1	472.17	584.26	60	04.4	572.56	485.22	380.02	248.78	144.97	100.2		(83)
Total gains –	nternal and	solar	(84)m =	= (73)m	+ (8	3)m ,	watts				_			
(84)m= 484.95	580.22 68	3.04	802.1	892.89	89	2.45	847.22	765.71	671.27	561.24	481.81	455.31		(84)
7. Mean inte	rnal tempera	ture ((heating	season	າ)									
Temperature	during heat	ing pe	eriods ir	n the livi	ng a	area fi	rom Tab	ole 9, Th	1 (°C)				21	(85)
Utilisation fac	ctor for gains	s for li	iving are	ea, h1,m	n (se	e Tal	ble 9a)							
Jan	<u> </u>	Лаг	Apr	May	T`	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 1		.98	0.91	0.76		.56	0.41	0.47	0.75	0.96	0.99	1		(86)
Mean interna (87)m= 19.91	· · ·	0.37	20.7	ea 11 (fo	1	N Step 0.99	21 21 25 25 25 25 25 25 25 25 25 25 25 25 25	10 1 abi	e 9C) 20.94	20.63	20.2	19.87		(87)
										20.03	20.2	19.07		(07)
Temperature		<u> </u>		i	-	<u> </u>			h2 (°C)				1	
(88)m= 20.03	20.03 20	0.03	20.04	20.04	20	0.05	20.05	20.05	20.05	20.04	20.04	20.04		(88)
Util <mark>isatio</mark> n fae	ctor for gains	for r	est of d	welling,	h2,r	m (se	e Ta <mark>ble</mark>	9a)						
(89)m= 1	0.99 0	97	0.88	0.7	0	.48	0.32	0.38	0.67	0.94	0.99	1		(89)
Me <mark>an int</mark> erna	l temperatu	e in t	he rest	of dwell	ina ⁻	T2 (fc	ollow ste	ps 3 to	7 in Tabl	e 9c)				
(90)m= 18.58		0.24	19.71	19.97	T -	0.04	20.05	20.05	20	19.62	19.01	18.53		(90)
									f	LA = Livir	n <mark>g area ÷ (</mark> 4	4) =	0.33	(91)
Moon interne	I tomporotu		r tha wh					. /1 fl		LA = Livir	n <mark>g</mark> area ÷ (4	4) =	0.33	(91)
Mean interna					elling		-A × T1		A) × T2				0.33]
(92)m= 19.02	19.25 19	9.61	20.03	20.28		0.35	A × T1 20.36	20.36	.A) × T2 20.31	19.95		4) = 18.97	0.33	(91)
(92)m= 19.02 Apply adjust	19.25 19	nean	20.03 interna	20.28 temper	elling 20 ratur	0.35 re fror	A × T1 20.36 m Table	20.36 4e, whe	.A) × T2 20.31 ere appro	19.95 opriate	19.4	18.97	0.33	(92)
(92)m= 19.02 Apply adjust (93)m= 19.02	19.25 19 nent to the r 19.25 19.25 19	9.61 nean 9.61	20.03	20.28	elling 20 ratur	0.35	A × T1 20.36	20.36	.A) × T2 20.31	19.95			0.33]
(92)m= 19.02 Apply adjustr (93)m= 19.02 8. Space hea	19.2519nent to the r19.2519.2519191919	0.61 nean 0.61 ment	20.03 internal 20.03	20.28 temper 20.28	elling 20 ratur 20	0.35 re fror 0.35	A × T1 20.36 m Table 20.36	20.36 4e, whe 20.36	A) × T2 20.31 ere appro 20.31	19.95 opriate 19.95	19.4	18.97 18.97		(92)
(92)m= 19.02 Apply adjust (93)m= 19.02	19.2519nent to the r19.2519.2519ating requiremean intern	0.61 nean 0.61 ment al tem	20.03 interna 20.03	20.28 I temper 20.28 re obtair	elling 20 ratur 20	0.35 re fror 0.35	A × T1 20.36 m Table 20.36	20.36 4e, whe 20.36	A) × T2 20.31 ere appro 20.31	19.95 opriate 19.95	19.4	18.97 18.97		(92)
(92)m= 19.02 Apply adjustr (93)m= 19.02 8. Space hea Set Ti to the	19.2519nent to the r19.25	0.61 nean 0.61 ment al tem	20.03 interna 20.03	20.28 I temper 20.28 re obtair	elling 20 ratur 20 ned	0.35 re fror 0.35	A × T1 20.36 m Table 20.36	20.36 4e, whe 20.36	A) × T2 20.31 ere appro 20.31	19.95 opriate 19.95	19.4	18.97 18.97		(92)
(92)m= 19.02 Apply adjust (93)m= 19.02 8. Space hea Set Ti to the the utilisation	19.2519ment to the r19.25	9.61 nean 9.61 ment al tem ains u Mar	20.03 interna 20.03 nperatur using Ta Apr	20.28 temper 20.28 re obtair able 9a	elling 20 ratur 20 ned).35 re fror).35 at ste	A × T1 20.36 m Table 20.36	20.36 4e, whe 20.36 Table 9	A) × T2 20.31 ere appro 20.31 o, so that	19.95 opriate 19.95 t Ti,m=(19.4 19.4 76)m an	18.97 18.97 d re-calc		(92)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space hea Set Ti to the the utilisation Jan	19.2519nent to the r19.2519ating requiremean internfactor for gaFebNctor for gains	9.61 nean 9.61 ment al tem ains u Mar	20.03 interna 20.03 nperatur using Ta Apr	20.28 temper 20.28 re obtair able 9a	elling 20 ratur 20 ned).35 re fror).35 at ste	A × T1 20.36 m Table 20.36	20.36 4e, whe 20.36 Table 9	A) × T2 20.31 ere appro 20.31 o, so that	19.95 opriate 19.95 t Ti,m=(19.4 19.4 76)m an	18.97 18.97 d re-calc		(92)
(92)m= 19.02 Apply adjust (93)m= 19.02 8. Space hea Set Ti to the the utilisation Jan Utilisation fac	19.2519nent to the r19.2519ating requiremean internfactor for gainsFebNctor for gains0.990	9.61 nean 9.61 ment al tem ains u Mar 5, hm: 96	20.03 interna 20.03 nperatur using Ta Apr 0.88	20.28 I temper 20.28 re obtair able 9a May 0.72	elling 20 ratur 20 ned	0.35 re fror 0.35 at ste	A × T1 20.36 m Table 20.36 ep 11 of Jul	20.36 4e, whe 20.36 Table 9 Aug	A) × T2 20.31 ere appro 20.31 o, so that Sep	19.95 opriate 19.95 t Ti,m=(Oct	19.4 19.4 76)m an Nov	18.97 18.97 d re-calc Dec		(92) (93)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space hea Set Ti to the the utilisation Jan Utilisation fac (94)m= 1	19.2519nent to the r19.2519nting requiremean internfactor for gainsFebNctor for gains0.990hmGm , W	9.61 nean 9.61 ment al tem ains u Mar 5, hm: 96	20.03 interna 20.03 nperatur using Ta Apr 0.88	20.28 I temper 20.28 re obtair able 9a May 0.72	elling 20 ratur 20 ned	0.35 re fror 0.35 at ste	A × T1 20.36 m Table 20.36 ep 11 of Jul	20.36 4e, whe 20.36 Table 9 Aug	A) × T2 20.31 ere appro 20.31 o, so that Sep	19.95 opriate 19.95 t Ti,m=(Oct	19.4 19.4 76)m an Nov	18.97 18.97 d re-calc Dec		(92) (93)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space hea Set Ti to the the utilisation Jan Utilisation fac (94)m= 1 Useful gains	19.2519nent to the r19.2519ating requiredmean internafactor for gainsCtor for gains0.990hmGm , W573.0565	9.61 nean 9.61 ment al ten ains u Mar 96 = (94 8.37	20.03 interna 20.03 nperatur using Ta Apr : 0.88 0.88 0.88 0.88	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91	elling 20 ratur 20 ned 0 45	0.35 re fror 0.35 at ste Jun .51	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35	20.36 4e, whe 20.36 Table 9 Aug 0.41	A) × T2 20.31 ere appro 20.31 5, so that Sep 0.69	19.95 opriate 19.95 t Ti,m=(Oct 0.94	19.4 19.4 76)m an Nov 0.99	18.97 18.97 d re-calc Dec 1		(92) (93)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space heat Set Ti to the the utilisation Utilisation factor (94)m= 1 Useful gains (95)m= 482.6	19.2519nent to the r19.2519nting requiremean internafactor for gainsfactor for gains0.990hmGm , W573.0565age externa	9.61 nean 9.61 ment al ten ains u Mar 96 = (94 8.37	20.03 interna 20.03 nperatur using Ta Apr : 0.88 0.88 0.88 0.88	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91	elling 20 ratur 20 ned 0	0.35 re fror 0.35 at ste Jun .51	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35	20.36 4e, whe 20.36 Table 9 Aug 0.41	A) × T2 20.31 ere appro 20.31 5, so that Sep 0.69	19.95 opriate 19.95 t Ti,m=(Oct 0.94	19.4 19.4 76)m an Nov 0.99	18.97 18.97 d re-calc Dec 1		(92) (93)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space heat Set Ti to the the utilisation Jan Utilisation fac (94)m= 1 Useful gains (95)m= 482.6 Monthly aver	19.2519nent to the r19.2519ating requiredmean internafactor for gainsfactor for gains0.990hmGm , W573.0565age externa4.96	9.61 nean 0.61 ment al tem ains u Mar 96 = (94 8.37 I tem 5.5	20.03 interna 20.03 nperatur using Ta Apr 0.88 0.88 0.88 0.88 0.88 0.88 0.88 0.8	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 e from T 11.7	elling 20 ratur 20 ned 0 45 able 1	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4	A) × T2 20.31 20.31 20.31 20.31 0, so that Sep 0.69 465.61	19.95 opriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6	19.4 19.4 76)m an Nov 0.99 476.59	18.97 18.97 d re-calc Dec 1 453.69		(92) (93) (94) (95)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space hea Set Ti to the the utilisation Jan Utilisation fac (94)m= 1 Useful gains (95)m= 482.6 Monthly aver (96)m= 4.3 Heat loss rat	19.2519nent to the r19.2519nent to the r19.2519nean internfactor for gainsfactor for gains0.990hmGm , W573.0565age externa4.96e for mean in	9.61 nean 0.61 ment al tem ains u Mar 96 = (94 8.37 I tem 5.5	20.03 interna 20.03 nperatur using Ta Apr 0.88 0.88 0.88 0.88 0.88 0.88 0.88 0.8	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 e from T 11.7	elling 20 ratur 20 ned 45 able	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4	A) × T2 20.31 20.31 20.31 20.31 0, so that Sep 0.69 465.61	19.95 opriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6	19.4 19.4 76)m an Nov 0.99 476.59	18.97 18.97 d re-calc Dec 1 453.69		(92) (93) (94) (95)
(92)m= 19.02 Apply adjusti (93)m= 19.02 8. Space heat Set Ti to the the utilisation Utilisation fact (94)m= 1 Useful gains (95)m= 482.6 Monthly aver (96)m= 4.3 Heat loss rat	19.25 19 nent to the r 19.25 19 19.25 19 19 ating required nent to the r 19 mean internation factor for gains 19 factor for gains 0.99 0 hmGm , W 573.05 65 age externation 4.9 6 e for mean in 1159.33 105	0.61 nean 0.61 ment al tem ains u Mar .96 = (94 8.37 I tem 5.5 nterna 57.54	20.03 interna 20.03 nperatur using Ta Apr 0.88 0.88 0.88 0.88 0.88 0.88 0.88 0.8	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 e from T 11.7 erature, 685.68	elling 20 ratur 20 ned 45 able 11 Lm 45	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6 , W = 6.66	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6 [(39)m x 298.52	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4 x [(93)m 313.97	A) × T2 20.31 20.31 20.31 20.31 0, so that 5, so that 0.69 465.61 14.1 - (96)m 494.45	19.95 opriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6] 747.7	19.4 19.4 76)m an Nov 0.99 476.59 7.1 986.09	18.97 18.97 d re-calc Dec 1 453.69 4.2		(92) (93) (94) (95) (96)
(92)m= 19.02 Apply adjusted $(93)m= 19.02$ 8. Space head Set Ti to the the utilisation Utilisation face $(94)m= 1$ Useful gains $(95)m= 482.6$ Monthly aven $(96)m= 4.3$ Heat loss rate $(97)m= 1190.78$	19.2519nent to the r19.2519nent to the r19.2519nting requiremean internafactor for gainsfactor for gains0.990hmGm , W573.0565age externa4.96e for mean in1159.33105ng requirement	0.61 nean 0.61 ment al tem ains u Mar .96 = (94 8.37 I tem 5.5 nterna 57.54	20.03 interna 20.03 nperatur using Ta Apr 0.88 0.88 0.88 0.88 0.88 0.88 0.88 0.8	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 e from T 11.7 erature, 685.68	elling 20 ratur 20 ned 45 able 1 1 Lm 45 Wh/	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6 , W = 6.66	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6 [(39)m x 298.52	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4 x [(93)m 313.97	A) × T2 20.31 20.31 20.31 20.31 0, so that 5, so that 0.69 465.61 14.1 - (96)m 494.45	19.95 opriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6] 747.7	19.4 19.4 76)m an Nov 0.99 476.59 7.1 986.09	18.97 18.97 d re-calc Dec 1 453.69 4.2		(92) (93) (94) (95) (96)
(92)m= 19.02 Apply adjustit (93)m= 19.02 8. Space heat Set Ti to the the utilisation Utilisation factorial (94)m= 1 Useful gains (95)m= 482.6 Monthly aver (96)m= 4.3 Heat loss rat (97)m= 1190.78 Space heating	19.2519nent to the r19.2519nent to the r19.2519nting requiremean internafactor for gainsfactor for gains0.990hmGm , W573.0565age externa4.96e for mean in1159.33105ng requirement	$\begin{array}{c c} 0.61 \\ nean \\ 0.61 \\ ment \\ al tem \\ ains u \\ Mar \\ S, hm: \\ 96 \\ s, hm: \\ 96 \\ s, hm: \\ 96 \\ s, hm: \\ 57 \\ s, hm: \\ 57 \\ s, hm: \\ for all tem \\ $	20.03 interna 20.03 nperatur using Ta Apr 0.88)m x (84 709.52 perature 8.9 al tempe 891.14 r each n	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 638.91 e from T 11.7 erature, 685.68 nonth, k	elling 20 ratur 20 ned 45 able 1 1 Lm 45 Wh/	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6 , W = 6.66	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6 ((39)m x 298.52 h = 0.02	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4 x [(93)m 313.97 24 x [(97 0	A) × T2 20.31 20.31 20.31 20.31 0, so that 5, so that 6, so that 6, so that 6, so that 14.1 14.1 - (96)m 494.45)m - (95)	19.95 ppriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6] 747.7)m] x (4 164.98	19.4 19.4 76)m an Nov 0.99 476.59 7.1 986.09 1)m 366.84	18.97 18.97 d re-calc Dec 1 453.69 4.2 1187.66 546.07		(92) (93) (94) (95) (96)
(92)m = 19.02 Apply adjustit $(93)m = 19.02$ 8. Space head Set Ti to the the utilisation Utilisation fact $(94)m = 1$ Useful gains $(95)m = 482.6$ Monthly aver $(96)m = 4.3$ Heat loss rat $(97)m = 1190.78$ Space heating	19.25 19 nent to the r 19.25 19 19.25 19 19 ating required 19.25 19 mean internation 10 10 factor for gains 0.99 0 hmGm , W 573.05 65 age externation 4.9 6 e for mean in 1159.33 105 agr requirement 393.98 29	$\begin{array}{c c} 0.61 \\ nean \\ 0.61 \\ ment \\ al tem \\ ains u \\ Mar \\$	20.03 interna 20.03 nperature using Ta Apr 0.88 0.89 0.81 0.83 0.9 0.14 0.30 0.76 0.33 0.76 0.33 0.76 0.33 0.76 0.33 0.76 0.57	20.28 I temper 20.28 re obtair able 9a May 0.72 4)m 638.91 2 from T 11.7 erature, 685.68 nonth, k 34.8	elling 20 ratur 20 ned 45 able 1 1 Lm 45 Wh/	0.35 re fror 0.35 at ste Jun .51 0.75 8 4.6 , W = 6.66	A × T1 20.36 m Table 20.36 ep 11 of Jul 0.35 297.85 16.6 ((39)m x 298.52 h = 0.02	20.36 4e, whe 20.36 Table 9 Aug 0.41 312.52 16.4 x [(93)m 313.97 24 x [(97 0	A) × T2 20.31 20.31 20.31 20.31 0, so that 5, so that 0.69 465.61 14.1 - (96)m 494.45)m - (95) 0	19.95 ppriate 19.95 t Ti,m=(Oct 0.94 525.95 10.6] 747.7)m] x (4 164.98	19.4 19.4 76)m an Nov 0.99 476.59 7.1 986.09 1)m 366.84	18.97 18.97 d re-calc Dec 1 453.69 4.2 1187.66 546.07	culate	(92) (93) (94) (95) (96) (97)

9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating sy	/stems i	ncluding	micro-C	HP)						
•	e heatir	•	4 fm												
	•			econdar		mentary			(204)				0		(201)
	•			nain syst	. ,			(202) = 1 -		(202)]			1		(202)
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$ Efficiency $(204) = (202) \times [1 - (203)] =$											1		(204)		
Efficiency of main space heating system 1											92.7	,	(206)		
Efficiency of secondary/supplementary heating system, %											0		(208)		
0	Jan	an Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec eating requirement (calculated above)									kW	/h/yea	ar		
Space	526.89	g require 393.98	296.98	130.76	34.8	0	0	0	0	164.98	366.84	546.07			
(211)m				100 ÷ (20			Ů	Ŭ	Ŭ	101.00	000.01	0 10.01			(211)
(211)11	568.38	425	320.36	141.06	37.54	0	0	0	0	177.97	395.73	589.07			(211)
								Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}		2655.	13	(211)
Space	e heatin	g fuel (s	econdar	·y), kWh/	month										4
= {[(98)m x (20	01)] } x 1	00 ÷ (20)8)				1			i	1			
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0			-
	_							Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	2=	0		(215)
	heating		tor (calc	ulated al											
Output	172.01	151.1	157.5	139.54	135.56	119.42	113.07	126.31	126.8	144.79	155.17	167.33			
Efficier	ncy of w	ater hea	iter					7					87		(216)
(217)m=	<mark>8</mark> 9.02	88.93	<mark>88</mark> .75	88.29	87.54	87	87	87	87	88.42	88.88	8 <mark>9.05</mark>			(217)
		heating, m x 100										-			
	193.23	169.9	177.47	158.06	154.85	137.26	129.97	145.19	145.74	163.76	174.58	187.9			
								Tota	I = Sum(2	19a) ₁₁₂ =			1937.	92	(219)
	I totals									k	Wh/year	r	kWh	/year	-
Space	heating	fuel use	ed, main	system	1								2655.	13	
Water	heating	fuel use	d										1937.	92	
Electri	city for p	oumps, f	ans and	electric	keep-ho	t									
centra	al heatir	ig pump	:									30			(230c)
boiler	with a f	an-assis	sted flue									45			(230e)
Total e	electricity	y for the	above,	kWh/yea	r			sum	of (230a).	(230g) =			75		(231)
Electri	city for li	ighting											333.6	64	(232)
Electri	city gen	erated b	y PVs										-833.3	39	(233)
12a. (CO2 em	issions -	– Individ	lual heati	ng syste	ems inclu	uding mi	cro-CHF)						_
							ergy /h/year			Emiss kg CO2	ion fac 2/kWh	tor	Emiss kg CO		r
Space	heating	(main s	ystem 1)			1) x			0.2		=	573.5		(261)
-	-	(second	-			(21	5) x			0.5		=	0		(263)
	heating		- /			(219	9) x			0.2		=	418.5	59	(264)

Space and water heating	(261)	+ (262) + (263) + (26	4) =			992.1	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x		0.519	=	38.93	(267)
Electricity for lighting	(232)	x		0.519	=	173.16	(268)
Energy saving/generation technologies Item 1				0.519	=	-432.53	(269)
Total CO2, kg/year			sum of	(265)(271) =		771.65	(272)
Dwelling CO2 Emission Rate			(272) ÷	- (4) =		10.14	(273)
EI rating (section 14)						91	(274)

