			User D	etails:						
Assessor Name: Software Name:	Natalie Wh Stroma FS			Stroma Softwa					027778 on: 1.0.4.6	
		F	Property A	Address:	Be Clea	an-Flat 7	-2nd Flo	oor		
Address :	Flat 7, Hamp	oshire street								
1. Overall dwelling dime	ensions:									
Ground floor				<b>a(m²)</b> 62.9	(1a) x	<b>Av. He</b>	<b>ight(m)</b> 2.4	(2a) =	Volume(m <sup>3</sup> ) 150.96	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(	1d)+(1e)+(1	n) e	62.9	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3d	)+(3e)+	.(3n) =	150.96	(5)
2. Ventilation rate:									<u> </u>	
Number of chimneys	main heating 0	seconda heating + 0	ry ] + [	other 0	] = [	total 0	x 4	40 =	m <sup>3</sup> per hour	(6a)
Number of open flues	0	+ 0	] + [	0	] = [	0	x 2	20 =	0	(6b)
Number of intermittent fa	ans				- F	2	x ′	10 =	20	(7a)
Number of passive vents	3					0	x ^	10 =	0	(7b)
Number of flueless gas f	ires					0	x 4	40 =	0	(7c)
					L	0			0	(10)
								Air ch	anges per ho	ur
Infiltration due to chimne	eys, flues and fa	ans = (6a)+(6b)+(	7a)+(7b)+(	7c) =	Г	20	<u> </u>	÷ (5) =	0.13	(8)
If a pressurisation test has l	been carried out or	is intended, procee	ed to (17), o	otherwise o	continue fro	om (9) to (				
Number of storeys in t	he dwelling (ns	;)							0	(9)
Additional infiltration							[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: C if both types of wall are p deducting areas of openi	present, use the val	lue corresponding t			•	uction			0	(11)
If suspended wooden			.1 (seale	ed), else	enter 0				0	(12)
lf no draught lobby, er	nter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,			•	•	•	etre of e	nvelope	area	5	(17)
If based on air permeabi	•						1		0.38	(18)
Air permeability value applie Number of sides shelter		on test nas been do	ne or a deg	gree air pei	rmeability i	is being us	sea		2	(19)
Shelter factor	50			(20) = 1 -	[0.075 x (1	9)] =			2 0.85	(13)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18)	) x (20) =				0.33	(21)
Infiltration rate modified	for monthly win	d speed								
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	beed from Table	e 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	I								
(22a)m= 1.27 1.25	1.23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18	]	

Adjuste	ed infiltr	ation rat	e (allowi	ing for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m						
	0.41	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.33	0.35	0.37	0.38			
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se			-					
				endix N, (2	(23a) – (23a	a) x Emv (e	equation (1	N5)) othe	rwise (23h	) – (23a)				0	(23a)
				viency in %						) = (200)				0	(23b)
					0		`		,	<b>)</b> h ) has is (1)	00h) [/	1 (00 a)		0	(23c)
a) If (24a)m=			anical ve			at recove		HR) (24a	a)m = (22)	20)m + (. 0	23D) × [*	1 – (23c) 0	÷100]		(24a)
			-	-	-				-	-		0			(240)
<i>,</i>		1	1	entilation	1	· · · · · ·	, <u>, ,</u>	<u>г , с</u>	ŕ	, <u>,</u>	, <u> </u>		l		(24b)
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(240)
,				ntilation of the	•	•				5 v (23h	N .				
(24c)m=	0				(231) = (231)			$\frac{c}{c} = (22)$	$\int \int \int \int \partial \nabla $		,) 0	0			(24c)
	•	÷	Ť	l ole hous	÷	, ,	, i		÷	0	0	0			(210)
,				)m = (22	•					0.5]					
(24d)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	, 0.55	0.56	0.57	0.57			(24d)
Effec	ctive air	change	rate - er	nter (24a	) or (24t	) or (24	L c) or (24	d) in boy	(25)		<u>.</u>				
(25)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57			(25)
						I	I	1		l	I		l		
				paramet										• •	
ELEN	IENI	Gro: area	ss (m²)	Openin rr		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·I		A X kJ/ŀ	
Doors			( )			1.87		1		1.87					(26)
Windov	ws Type	e 1				7.92	= .	/[1/( 1.4 )+	0.04] =	10.5					(27)
	ws Type					2.25	=	/[1/( 1.4 )+	Ļ						(27)
							<u> </u>		L	2.98					
	ws Type					1.52		/[1/( 1.4 )+	0.04] =	2.02	╡,		—		(27) T
Walls		68.9		13.5	6	55.42	<u>2</u> X	0.18	=	9.98					(29)
Total a	rea of e	elements	s, m²			68.98	3								(31)
Party v	vall					27.98	3 X	0	=	0					(32)
Party fl	loor					62.9					[				(32a)
Party c	eiling					62.9					[				(32b)
				effective wi nternal wal			ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	3.2		
Fabric	heat los	ss, W/K	= S (A x	U)				(26)(30)	) + (32) =				27	.34	(33)
Heat ca	apacity	Cm = S	(A x k )						((28)	.(30) + (32	2) + (32a).	(32e) =	(	0	(34)
Therma	al mass	parame	eter (TM	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		2	50	(35)
	-		nere the de tailed calc	etails of the ulation.	construct	ion are noi	t known pr	recisely the	e indicative	values of	TMP in Ta	able 1f			-
Therma	al bridg	es : S (L	. x Y) cal	culated	using Ap	pendix I	<						8.	97	(36)
if details	of therma	al bridging	are not kr	nown (36) =	= 0.15 x (3	1)									<b>_</b>
Total fa	abric he	at loss							(33) +	(36) =			36	.31	(37)
Ventila	tion hea	at loss c	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=	29.19	29.02	28.86	28.09	27.95	27.28	27.28	27.16	27.54	27.95	28.24	28.54			(38)
Heat tr	ansfer	coefficie	nt, W/K						(39)m	= (37) + (3	38)m				
(39)m=	65.5	65.33	65.17	64.4	64.26	63.59	63.59	63.47	63.85	64.26	64.55	64.85			
		•	•	•		•	•	•	•		· · · ·				

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Average = Sum(39)<sub>1...12</sub> /12=  $64.4_{age 2}$ 

Heat lo	oss para	meter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	1.04	1.04	1.04	1.02	1.02	1.01	1.01	1.01	1.02	1.02	1.03	1.03		
Numb	er of day	vs in mo	nth (Tab		•		•	•		Average =	Sum(40) <sub>1</sub> .	12 /12=	1.02	(40)
Numb	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ater hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF if TF	A > 13. A £ 13.	9, N = 1	+ 1.76 >			•		)2)] + 0.0		TFA -13		06		(42)
Reduce	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.18		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres pe	r day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	91.5	88.17	84.84	81.52	78.19	74.86	74.86	78.19	81.52	84.84	88.17	91.5		
_											m(44) <sub>112</sub> =		998.16	(44)
Energy	content of	hot water	used - ca	Iculated m	onthly = 4. 1	190 x Vd,r I	m x nm x L 1	OTm / 3600	) kWh/mor I	· ·		c, 1d)	I	
(45)m=	135.69	118.67	122.46	106.77	102.44	88.4	81.92	94	95.12	110.86	121.01	131.41		<b>-</b>
lf instan	taneous v	/ater heati	ng at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	m(45) <sub>112</sub> =	-	1308.75	(45)
(46)m=	20.35	17.8	18.37	16.01	15.37	13.26	12.29	14.1	14.27	16.63	18.15	19.71		(46)
Water	storage	loss:												
Storag	je volum	e (litres)	) includir	ng any s	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
Otherv		o stored		ank in dw er (this ir	-			ı (47) ombi boil	ers) ente	er '0' in (	47)			
	-		eclared	loss fact	or is kno	wn (kWł	n/day):				(	0		(48)
Tempe	erature f	actor fro	m Table	e 2b								0		(49)
υ.	•		•	e, kWh/y			l	(48) x (49)	) =			0		(50)
				cylinder rom Tab								0		(51)
		•	see secti			.,	~])					0		(0.)
Volum	e factor	from Ta	ble 2a									0		(52)
Tempe	erature f	actor fro	m Table	e 2b								0		(53)
•			-	e, kWh/y	ear			(47) x (51)	) x (52) x (	53) =		0		(54)
	. ,	(54) in (ধ										0		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (	55) × (41)	m				
(56)m=	0 er contain	0 dedicate	0 d solar sto	0	0 = (56)m	0 = (50) = (	$0$ (H11)1 $\div$ (5)	0 50), else (5	0 7)m - (56)	0 m where (	0 H11) is fro	0 m Append	iv H	(56)
(57)m=		0	0	0	0	0	0	0), cise (5	0		0	0		(57)
				1										
	•	•	,	om Table		E0)		25 (44)	~			0		(58)
	•						. ,	65 × (41) ng and a		r thermo	istat)			
(110) (59)m=											0	0		(59)
× 977		-				_	_			_	-	-	l	

Combi	loss ca	lculated	for eac	h month	(61)m =	(60) ÷ 3	865 × (41	)m						
(61)m=	46.63	40.58	43.24	40.2	39.84	36.92	38.15	39.84	40.2	43.24	43.48	46.63		(61)
Total h	eat req	uired for	water	heating c	alculate	d for eac	ch month	(62)m	= 0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	182.32	159.26	165.7	146.97	142.29	125.32	120.07	133.85	5 135.32	154.09	164.49	178.03		(62)
Solar DH	-IW input	calculated	using Ap	pendix G o	r Appendi	x H (nega	tive quantit	y) (enter	'0' if no sola	r contribut	tion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	S and/or	WWHR	S applies	s, see Ap	pendix	G)			_		
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
WWHR	5 -41.14	-36.19	-36.94	-30.43	-28.27	-23.33	-19.77	-23.93	-24.61	-30.41	-35.19	-39.75		(63) (G10)
Output	from w	ater hea	ter											
(64)m=	141.18	123.07	128.76	116.54	114.02	101.99	100.3	109.92	2 110.71	123.69	129.3	138.28		
						•	•	Οι	itput from w	ater heate	r (annual)	112	1437.75	(64)
Heat g	ains fro	m water	heatin	g, kWh/m	onth 0.2	25 ´ [0.85	5 × (45)m	n + (61)	m] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	]	
(65)m=	56.77	49.61	51.53	45.55	44.02	38.62	36.77	41.22	41.68	47.67	51.11	55.35		(65)
inclu	ide (57)	m in calo	ulatior	n of (65)m	only if	cylinder	is in the	dwellin	g or hot w	vater is f	rom com	n Imunity h	eating	
5. Int	ternal ga	ains (see	e Table	5 and 5a	):				-			•	-	
	Ŭ	ns (Table			/									
Melab	Jan	Feb	Mar		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	123.74	123.74	123.74		123.74	123.74	123.74	123.74		123.74	123.74	123.74		(66)
l iahtin	n dains	i (calcula	ted in <i>i</i>	Appendix	l equa	tion 1.9 c	u orl9a)a	lso see	Table 5		I	I	1	
(67)m=	40.24	35.74	29.07	22.01	16.45	13.89	15.01	19.51	26.18	33.24	38.8	41.36		(67)
	L	ins (calc		1		L Juation I	13 or 1 1	I 3a) als	so see Ta	L ble 5			1	
(68)m=	268.95	271.74	264.71		230.84	· ·	1	198.42	-	220.42	239.32	257.08		(68)
									see Table	I	Į		1	
(69)m=	49.44	49.44	49.44	49.44	49.44	49.44	49.44	49.44		49.44	49.44	49.44	]	(69)
		ns gains											I	
(70)m=				3	3	3	3	3	3	3	3	3	]	(70)
	_						Ů		Ů	Ŭ	Ů	Ů		()
LOSSES (71)m=	-82.49	-82.49	-82.49	ative valu	-82.49	-82.49	-82.49	-82.49	-82.49	-82.49	-82.49	-82.49	1	(71)
					-02.49	-02.49	-02.49	-02.48	-02.49	-02.49	-02.49	-02.49		(('')
		gains (T	· · · · ·		50.47	50.04	1 40 40		57.00			74.00	1	(70)
(72)m=	76.31	73.82	69.26	63.26	59.17	53.64	49.43	55.4	57.89	64.07	70.98	74.39		(72)
		gains =			<u> </u>	````	1	· · ·	n + (69)m + ·		1	, 	1	(
(73)m=		474.98	456.72	428.69	400.14	374.29	359.32	367	383.2	411.42	442.78	466.52		(73)
	lar gain													
-			-						convert to th	ie applicat		uon.	Coine	
Orienta		Access F Table 6d		Area m²	l		ux able 6a		g_ Table 6b	Т	FF able 6c		Gains (W)	
Southe	ast <mark>0.9x</mark>	0.77		× 1.	52	x	36.79	x	0.35	x	0.8	=	10.85	(77)
Southe	ast <mark>0.9x</mark>	0.77		× 1.	52	x	62.67	) x [	0.35	× [	0.8	=	18.48	(77)
Southe	ast <mark>0.9x</mark>	0.77		× 1.	52	x	85.75	i × [	0.35		0.8	=	25.29	(77)

х

1.52

106.25

х

x

0.35

x

0.8

0.77

Southeast 0.9x

31.34

(77)

Couthoost	. г								1	<b></b>		-, r				<b></b>
Southeast (		0.77	X	1.5	52	x	1	19.01	X		0.35		0.8	=	35.1	(77)
Southeast c		0.77	X	1.	52	x	1	18.15	X		0.35	×	0.8	=	34.85	(77)
Southeast (		0.77	X	1.	52	X	1	13.91	x		0.35	×	0.8	=	33.6	(77)
Southeast (		0.77	x	1.5	52	x	1	04.39	x		0.35	×	0.8	=	30.79	(77)
Southeast (	.9x	0.77	X	1.5	52	x	g	2.85	x		0.35	x	0.8	=	27.39	(77)
Southeast 0	.9x	0.77	х	1.	52	x	6	9.27	x		0.35	×	0.8	=	20.43	(77)
Southeast (	.9x	0.77	X	1.	52	x	4	4.07	x		0.35	x	0.8	=	13	(77)
Southeast 0	.9x	0.77	x	1.	52	x	3	31.49	x		0.35	×	0.8	=	9.29	(77)
Southwest	.9x	0.77	x	2.2	25	x	3	6.79	]		0.35	x	0.8	=	16.06	(79)
Southwest	.9x	0.77	x	2.2	25	x	6	2.67	]		0.35	×	0.8	=	27.36	(79)
Southwest	.9x	0.77	x	2.2	25	x	8	5.75	]		0.35	x	0.8	=	37.44	(79)
Southwest	.9x	0.77	x	2.2	25	x	1	06.25	]		0.35	×	0.8	=	46.39	(79)
Southwest	.9x	0.77	x	2.2	25	x	1	19.01	]		0.35	×	0.8	=	51.96	(79)
Southwest	.9x	0.77	x	2.2	25	x	1	18.15	1		0.35	×	0.8	=	51.58	(79)
Southwest	.9x	0.77	x	2.2	25	x	1	13.91	ĺ		0.35	_ × [	0.8	=	49.73	(79)
Southwest	.9x	0.77	x	2.2	25	x	1	04.39	ĺ		0.35		0.8	=	45.58	(79)
Southwest	.9x	0.77	x	2.2	25	x	g	2.85	ĺ		0.35	_ x [	0.8	=	40.54	(79)
Southwest	.9x	0.77	x	2.2	25	x	6	9.27	1		0.35		0.8	=	30.24	(79)
Southwest	.9x	0.77	x	2.2	25	x	4	4.07	1		0.35		0.8	=	19.24	(79)
Southwest	.9x	0.77	x	2.2	25	x	3	31.49	i		0.35	×	0.8	=	13.75	(79)
Northwest 0	.9x	0.77	x	7.9	92	x	1	1.28	x		0.35	= .	0.8	=	17.34	(81)
Northwest 0	.9x	0.77	x	7.9	92	x	2	2.97	l x		0.35		0.8	=	35.3	(81)
Northwest 0	.9x	0.77	x	7.9	92	x	4	1.38	x		0.35		0.8	=	63.59	(81)
Northwest 0	.9x	0.77	x	7.9	92	x	6	57.96	x		0.35		0.8	=	104.43	(81)
Northwest 0	.9x	0.77	x	7.9	92	x	g	1.35	l x		0.35	Ξ × Ϊ	0.8	=	140.38	(81)
Northwest (	.9x	0.77	x	7.9	92	x	g	7.38	x		0.35	× [	0.8	=	149.66	(81)
Northwest 0	.9x	0.77	x	7.9	92	x		91.1	x		0.35	× [	0.8		140	(81)
Northwest (	.9x	0.77	x	7.9	92	x	7	2.63	x		0.35	× [	0.8	=	111.61	(81)
Northwest (	.9x	0.77	x	7.9	92	x	5	0.42	x		0.35		0.8	=	77.49	(81)
Northwest (	.9x	0.77	x	7.9		x		8.07	) x		0.35	L	0.8	=	43.13	(81)
Northwest 0	.9x [	0.77	x	7.9		x		14.2	x		0.35	i	0.8		21.82	(81)
Northwest 0	.9x	0.77	x			x		9.21	x		0.35	\ [	0.8	=	14.16	(81)
	L				-				1			L				
Solar gain	s in v	watts, ca	alculated	l for eac	h month	ר			(83)m	ו = Sו	um(74)m .	(82)m				
	.26	81.14	126.32	182.16	227.44	-	36.09	223.33	187		145.41	93.8	54.06	37.19	]	(83)
Total gains	s – ir	nternal a	nd solar	. (84)m =	- = (73)m	+ (8	83)m	, watts					-		4	
(84)m= 523	3.44	556.13	583.04	610.85	627.58	6	10.38	582.66	554	.98	528.61	505.22	496.84	503.72		(84)
7. Mean i	nteri	nal temp	erature	(heating	seasor	า)			•				•		-	
Tempera				`````		<i>´</i>	area	from Tab	ole 9	, Th	1 (°C)				21	(85)
Utilisation		-				-			- 0	, .,	x = /				· ·	<b></b> ` ´
	an	Feb	Mar	Apr	May	T	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	]	
	99	0.99	0.97	0.93	0.83	-	0.64	0.48	0.5	-	0.76	0.94	0.98	0.99	1	(86)
				l	1	1		1	L				1		J	

Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	20.12	20.23	20.42	20.68	20.88	20.98	21	20.99	20.94	20.7	20.38	20.1		(87)
Temp	erature	during h	neating p	periods ir	n rest of	dwelling	from Ta	able 9, Tl	h2 (°C)					
(88)m=	20.05	20.05	20.05	20.06	20.07	20.07	20.07	20.08	20.07	20.07	20.06	20.06		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling, I	h2,m (se	e Table	9a)						
(89)m=	0.99	0.98	0.96	0.91	0.77	0.56	0.38	0.42	0.68	0.91	0.98	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	18.9	19.06	19.33	19.69	19.95	20.06	20.07	20.07	20.03	19.74	19.27	18.87		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.34	(91)
Mean	interna	l temper	ature (fc	or the wh	ole dwe	llina) = fl	LA x T1	+ (1 – fL	A) x T2					
(92)m=	19.31	19.45	19.7	20.02	20.26	20.37	20.38	20.38	20.34	20.06	19.65	19.29		(92)
Apply	adjustn	nent to t	he mear	n internal	l temper	ature fro	m Table	4e, whe	ere appro	opriate			1	
(93)m=	19.31	19.45	19.7	20.02	20.26	20.37	20.38	20.38	20.34	20.06	19.65	19.29		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the i	mean int	ternal ter	mperatur	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	ulate	
the ut	tilisation	r	r	using Ta	ible 9a	r	r	· · · · ·		r	r		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	r		ains, hm I	î 👘	·	i	i	i		i	i	i	I	()
(94)m=	0.98	0.98	0.96	0.91	0.79	0.59	0.41	0.45	0.71	0.91	0.97	0.99		(94)
	<u> </u>	1	i	4)m x (84	<u> </u>						· · · · · · · · · · · · · · · · · · ·		I	(05)
(95)m=	515.4	543.36	558.68	553.12	493.42	357.97	239.61	251.13	374.06	461.53	483.27	497.25		(95)
			1	perature	r	1							I	(00)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
	r	i	i i	al tempe		i	<u> </u>		· ,				I	(07)
(97)m=	983.32	950.86	860.29	716.48	550.26	366.83	240.63	252.84	398.12	608.06	809.82	978.41		(97)
•	r	<u> </u>	1	or each m	1	i	1		,	<u>í -                                   </u>	· · · · · · · · · · · · · · · · · · ·		I	
(98)m=	348.13	273.84	224.39	117.62	42.29	0	0	0	0	109.02	235.11	357.99		<b>-</b>
								Tota	l per year	(kWh/year	) = Sum(9	8)15,912 =	1708.39	(98)
Space	e heatin	g require	ement in	kWh/m²	?/year								27.16	(99)
9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
Spac	e heatir	ng:												
Fracti	ion of sp	ace hea	at from s	econdary	y/supple	mentary	system						0	(201)
Fracti	ion of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fracti	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 heat	ing syste	em 1								89.5	(206)
Efficie	ency of s	seconda	ry/suppl	ementar	y heating	g system	ז, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space	e heatin	g require	ement (c	alculate		)								
	348.13	273.84	224.39	117.62	42.29	0	0	0	0	109.02	235.11	357.99		
(211)m	n = {[(98	)m x (20	)4)] } x 1	00 ÷ (20	)6)								1	(211)
. /	388.97	305.97	250.72	131.42	47.25	0	0	0	0	121.8	262.7	399.98		
								Tota	l (kWh/yea	ar) =Sum(2	211) <sub>15,1012</sub>	=	1908.81	(211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)		-		-				-	
(215)m= 0 0 0 0	0 0	0	0	0	0	0	0		_
			Tota	l (kWh/yea	ar) =Sum(2	215) <sub>15,1012</sub>	2=	0	(215)
-	(0)								
		100.3	109.92	110.71	123.69	129.3	138.28	]	
Efficiency of water heater								89.5	(216)
(217)m= 89.5 89.5 89.5 89.5 8	39.5 89.5	89.5	89.5	89.5	89.5	89.5	89.5		(217)
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$			-			-	-	_	
(219)m= 157.74 137.5 143.86 130.21 12	27.4 113.95	112.07	122.81	123.7	138.2	144.47	154.5		_
			Tota	I = Sum(2				1606.42	(219)
Annual totals					k	Wh/year	r	kWh/year	7
								1606.42	1
-	ep-hot								J
central heating pump:							30	]	(230c)
boiler with a fan-assisted flue							45		(230e)
Total electricity for the above, kWh/year			sum	of (230a).	(230g) =	:		75	(231)
10a. Fuel costs - individual heating syste	ms:								
10a. Fuel costs - individual heating syste		ما			Fuel P	Price		Fuel Cost	
10a. Fuel costs - individual heating syste	Fu								
	<b>Fu</b> kW	/h/year			(Table	12)	x 0.01 =	£/year	](240)
Space heating - main system 1	<b>Fu</b> kW (211	/h/year 1) x			(Table	12) <sup>18</sup>		£/year 66.43	-
Space heating - main system 1 Space heating - main system 2	<b>Fu</b> kW (211 (213	/h/year 1) x 3) x			(Table 3.4	12) 18	x 0.01 =	£/year 66.43 0	(241)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary	Fu kW (211 (213 (215	/h/year 1) x 3) x 5) x			(Table 3.4	12) 18 19	x 0.01 = x 0.01 =	£/year 66.43 0	(241)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel)	Fu kW (211 (213 (215	/h/year 1) x 3) x 5) x 9)			(Table	12) 18 19 18	x 0.01 = x 0.01 = x 0.01 =	£/year 66.43 0 0 55.9	(241) (242) (247)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230	Fu kW (211 (213 (215 (215 (215 (237 ) ) ) Separately	/h/year 1) x 3) x 5) x 9) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	£/year 66.43 0 0 55.9 9.89 Table 12a	](241) ](242) ](247) ](249)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting	Fu kW (211 (213 (215 (215 (215 (237 ) ) ) Separately	/h/year 1) x 3) x 5) x 9) 1) y as app	licable a	nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5	(241) (242) (247)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12)	Fu kW (211 (213 (215 (215 (232 Og) separately (232	/h/year 1) x 3) x 5) x 9) 1) y as app 2)	licable a	nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5	(241) (242) (247) (249) (250)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and	Fu kW (211 (213 (214 (214 (232 Og) separately (232 (254) as need	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 = rding to	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5 120	(241) (242) (247) (249) (250)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and C Total energy cost	Fu kW (211 (213 (214 (214 (214 (237 Dg) separately (237 (254) as need (254) as need	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	$\begin{array}{l} x \ 0.01 = \\ \end{array}$	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5 120	(241) (242) (247) (249) (250) (250)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and C Total energy cost (2 11a. SAP rating - individual heating system	Fu kW (211 (213 (214 (214 (214 (237 Dg) separately (237 (254) as need (254) as need	/h/year 1) x 3) x 5) x 9) 1) y as app 2) ded		nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	$\begin{array}{l} x \ 0.01 = \\ \end{array}$	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5 120 289.72	(241) (242) (247) (249) (250) (250)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and C Total energy cost 11a. SAP rating - individual heating syste Energy cost deflator (Table 12)	Fu kW (211 (213 (215 (214 (214 (214 (215) (232 (232 (232 (254) as need (245)(247) + (25 (254) as need	/h/year 1) x 3) x 5) x 9) 1) y as app ded 50)(254)	=	nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	$\begin{array}{l} x \ 0.01 = \\ \end{array}$	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5 120 289.72 0.42	(241) (242) (247) (249) (250) (251) (255)
Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230 Energy for lighting Additional standing charges (Table 12) Appendix Q items: repeat lines (253) and C Total energy cost Ina. SAP rating - individual heating syste Energy cost deflator (Table 12) Energy cost factor (ECF)	Fu kW (211 (213 (215 (214 (214 (214 (215) (232 (232 (232 (254) as need (245)(247) + (25 (254) as need	/h/year 1) x 3) x 5) x 9) 1) y as app ded 50)(254)	=	nd apply	(Table 3.4 0 13. 3.4 13. 7 fuel pri	12) 18 19 19 19 19 ce accor	$\begin{array}{l} x \ 0.01 = \\ \end{array}$	£/year 66.43 0 0 55.9 9.89 Table 12a 37.5 120 289.72 0.42 1.13	(241) (242) (247) (249) (250) (250) (255)

	<b>Energy</b> kWh/year	Emission factor kg CO2/kWh	<b>Emissions</b> kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	412.3 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	346.99 (264)
Space and water heating	(261) + (262) + (263) + (26	64) =	759.29 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	147.54 (268)
Total CO2, kg/year		sum of (265)(271) =	945.75 (272)
CO2 emissions per m <sup>2</sup>		(272) ÷ (4) =	15.04 (273)
El rating (section 14)			88 (274)
13a. Primary Energy			
13a. Primary Energy	<b>Energy</b> kWh/year	<b>Primary</b> factor	<b>P. Energy</b> kWh/year
13a. Primary Energy Space heating (main system 1)	•••	•	•••
	kWh/year	factor	kWh/year
Space heating (main system 1)	kWh/year (211) x	factor =	kWh/year 2328.75 (261)
Space heating (main system 1) Space heating (secondary)	kWh/year (211) x (215) x	factor = 1.22 = 3.07 = 1.22 =	kWh/year 2328.75 (261) 0 (263)
Space heating (main system 1) Space heating (secondary) Energy for water heating	kWh/year (211) x (215) x (219) x	factor = 1.22 = 3.07 = 1.22 =	kWh/year 2328.75 (261) 0 (263) 1959.83 (264)
Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (26	factor 1.22 = 3.07 = 1.22 = 64) =	kWh/year 2328.75 (261) 0 (263) 1959.83 (264) 4288.58 (265)
Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (26 (231) x	factor 1.22 = 3.07 = 1.22 = 54) = 3.07 =	kWh/year 2328.75 (261) 0 (263) 1959.83 (264) 4288.58 (265) 230.25 (267)

Assessor Name:       Natalie Wheeler       Stroma Number:       STR0027778         Software Name:       Stroma FSAP 2012       Software Version:       Version: 1.0.4.6         Property Address: Be Clean-Flat 7-2nd Floor         Address :       Flat 7, Hampshire street       Image: Clean Strome Street         1. Overall dwelling dimensions:       Area(m²)       Av. Height(m)       Volume(m³)         Ground floor       62.9       (1a) x       2.4       (2a) =       150.96       (3a)	
Property Address: Be Clean-Flat 7-2nd Floor         Address :       Flat 7, Hampshire street         1. Overall dwelling dimensions:       Area(m²)       Av. Height(m)       Volume(m³)	
Address :       Flat 7, Hampshire street         1. Overall dwelling dimensions:       Area(m²)         Av. Height(m)       Volume(m³)	
1. Overall dwelling dimensions:       Area(m²)       Av. Height(m)       Volume(m³)	
Area(m <sup>2</sup> ) Av. Height(m) Volume(m <sup>3</sup> )	
Ground floor 62.9 (1a) x 2.4 (2a) = 150.96 (3a)	a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 62.9 (4)	
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 150.96$ (5)	I
2. Ventilation rate:	
main secondary other total m <sup>3</sup> per hour heating heating	
Number of chimneys $0 + 0 + 0 = 0$ $x 40 = 0$ (6a)	a)
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$ (6b)	<b>)</b>
Number of intermittent fans $2 \times 10 = 20$ (7a)	a)
Number of passive vents $0 \times 10 = 0$ (7b)	<b>)</b>
Number of flueless gas fires 0 (7c	)
Air changes per hour	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 20$ $\div$ (5) = 0.13 (8)	
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)	
Number of storeys in the dwelling (ns)	
Additional infiltration $[(9)-1]\times 0.1 = 0$ (10)	))
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	I)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12	2)
If no draught lobby, enter 0.05, else enter 0 0 (13	3)
Percentage of windows and doors draught stripped 0 (14	1)
Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0       (15)	5)
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16)	3)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 5 (17	7)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ (18	3)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered 2 (19	ر د
Number of sides sheltered         2         (19           Shelter factor $(20) = 1 - [0.075 \times (19)] =$ $0.85$ (20)	
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ $0.33$ $(21)$	
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 ÷ 4	
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m				_	
<b>.</b>	0.41	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.33	0.35	0.37	0.38		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se	-		-		-		(00-)
				andix N (2	3h) - (23a	a) x Emv (e	equation (I	N5)) , other	wise (23h	) – (23a)			0	(23a)
			0 11		, (	, ,		n Table 4h)		) = (200)			0	(23b)
			-	-	-					2b)m i (	22h) v [/	1 (22a)	0	(23c)
(24a)m=	r							HR) (24a	$0^{111} = (22)^{111}$		230) × [	1 - (230)	- 100j	(24a)
			_	-	-	-		-	-	-		0		(210)
(24b)m=								VV) (24b	0 $11 = (22)$	$\frac{2}{0}$ $\frac{1}{0}$ $\frac{1}{0}$	230)	0	l	(24b)
		-	_	-	-	-	-		•	0	0	0		(240)
,					•	•		on from c c) = (22b		5 x (23h	))			
(24c)m=	r í í	0	0		0				0		0	0		(24c)
		ventilatio	n or wh	ole hous	e nositiv	/e input	ventilati	on from l	oft					
,					•			0.5 + [(2		0.5]				
(24d)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(24d)
Effe	ctive air	change	rate - er	nter (24a	) or (24t	o) or (24	c) or (24	d) in box	(25)			-		
(25)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(25)
2 40	at locco	e and he		paramete	or:			•			•			
ELEN		Gros		Openin		Net Ar	22	U-valı		AXU		k-value	2	AXk
		area		m		A,r		W/m2		(W/I	K)	kJ/m²·ł		kJ/K
Doors						1.87	x	1	=	1.87				(26)
Windo	ws Type	e 1				7.92		/[1/( 1.4 )+	0.04] =	10.5	=			(27)
Windo	ws Type	2				2.25		/[1/( 1.4 )+	0.04] =	2.98	=			(27)
	ws Type					1.52		/[1/( 1.4 )+	0.04] =	2.02	$\exists$			(27)
Walls		68.9	18	13.5	<u> </u>	55.42		0.18		9.98	= ,			(29)
	area of e	elements		10.0	<u> </u>	68.98		0.10	[	0.00	L			(31)
Party v			,							0	r			(32)
Party f						27.98		0	=	0			$\dashv$	
						62.9					Ļ		$\dashv$	(32a)
Party o	-			<b>f f i i i i i i i i i i</b>		62.9		. (	15/4/11		L			(32b)
				nternal wal			ated using	g formula 1,	/[(1/U-Valu	ie)+0.04j a	as given in	paragraph	3.2	
		ss, W/K :			,			(26)(30)	+ (32) =				27.34	(33)
		Cm = S(		,					((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
			. ,		- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For desi	ign assess	sments wh	ere the de	tails of the	construct	ion are not	t known pi	recisely the	indicative	values of	TMP in Ta	able 1f		
		ad of a de												
	-			culated u		-	<						8.97	(36)
			are not kr	own (36) =	= 0.15 x (3	1)			(22)	(20)				
	abric he		-     - 4	l	_					(36) =			36.31	(37)
ventila		i	i	monthl		1	1.1	Δ	. ,	= 0.33 × (		<b></b>	l	
(20)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(38)
(38)m=	29.19	29.02	28.86	28.09	27.95	27.28	27.28	27.16	27.54	27.95	28.24	28.54		(30)
	r	coefficier	· · · · · ·						. ,	= (37) + (3			I	
(39)m=	65.5	65.33	65.17	64.4	64.26	63.59	63.59	63.47	63.85	64.26	64.55	64.85		
Stroma	FSAP 201	2 Version	: 1.0.4.6 (\$	SAP 9.92) ·	- http://ww	w.stroma.c	com		/	Average =	Sum(39)1	12 /12=	64.4	age 2 of 39)

Stroma FSAP 2012 Version: 1.0.4.6 (SAP 9.92) - http://www.stroma.com

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.04	1.04	1.04	1.02	1.02	1.01	1.01	1.01	1.02	1.02	1.03	1.03		
Numb	er of day	us in mo	nth (Tab	le 1a)					,	Average =	Sum(40)1.	12 /12=	1.02	(40)
Numb	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ater heat	ting ene	rav reau	irement:								kWh/ye	ear:	
		ipancy, I											I	(40)
if TF	A > 13.9	9, N = 1		[1 - exp	(-0.0003	49 x (TF	FA -13.9	)2)] + 0.0	0013 x ( <sup>-</sup>	TFA -13.		06		(42)
	A £ 13.9							(05 ··· NI)	. 00				I	(10)
								(25 x N) to achieve		se target o		.18		(43)
not mor	e that 125	litres per	person pe	r day (all w	vater use, l	not and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wat	er usage i	n litres pei	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	91.5	88.17	84.84	81.52	78.19	74.86	74.86	78.19	81.52	84.84	88.17	91.5		
_			,								m(44) <sub>112</sub> =		998.16	(44)
Energy	content of	hot water	used - cai	culated me	Some state of the second seco	190 x Vd,r	n x nm x L	OTm / 3600	) kWh/mor	I		c, 1d)	1	
(45)m=	135.69	118.67	122.46	106.77	102.44	88.4	81.92	94	95.12	110.86	121.01	131.41		<b>-</b>
lf instan	taneous w	vater heati	na at poin	of use (no	o hot water	storage).	enter 0 in	boxes (46		Total = Su	m(45) <sub>112</sub> =	-	1308.75	(45)
										16.62	10.15	10.71	l	(46)
(46)m= Water	20.35 storage	17.8 IOSS:	18.37	16.01	15.37	13.26	12.29	14.1	14.27	16.63	18.15	19.71		(40)
	-		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If com	munity h	eating a	ind no ta	ink in dw	velling, e	nter 110	) litres in	ı (47)						
Otherv	vise if no	o stored	hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (	47)			
	storage												L	
					or is kno	wn (kWł	n/day):					0		(48)
			m Table									0		(49)
			•	, kWh/ye		or io not	known	(48) x (49)	) =		(	0		(50)
				•	loss fact le 2 (kWl							0		(51)
		•	ee secti			.,					` <u>`</u>	0		(0.)
Volum	e factor	from Ta	ble 2a								(	0		(52)
Tempe	erature f	actor fro	m Table	2b							(	0		(53)
0.			•	, kWh/ye	ear			(47) x (51)	) x (52) x (	53) =	(	0		(54)
Enter	(50) or (	(54) in (5	55)								(	0		(55)
Water	storage	loss cal	culated	for each	month		_	((56)m = (	55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (	H11)] ÷ (5	50), else (5	7)m = (56)	m where (	H11) is fro	m Append	ix H	
(57)m=	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					
(mo	dified by	factor f	rom Tab	le H5 if t	here is s	olar wat	ter heati	ng and a	cylinde	r thermo	stat)		L	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)

Combi	loss ca	lculated	for each	month (	61)m =	(60)	÷ 365	× (41)	m								
(61)m=	46.63	40.58	43.24	40.2	39.84	36.	92 3	38.15	39.8	34	40.2	43.24	43.48	46	.63		(61)
Total h	eat req	uired for	water he	eating ca	alculate	d for	each n	nonth	(62)r	n =	0.85 × (	45)m +	· (46)m +	(57)	m +	(59)m + (61)m	
(62)m=	182.32	159.26	165.7	146.97	142.29	125	.32 1	20.07	133.	85	135.32	154.09	164.49	178	3.03		(62)
Solar DH	IW input	calculated	using App	endix G or	Appendi	x H (ne	egative	quantity	) (ente	er '0'	if no solar	r contribu	ition to wate	er hea	ating)		
(add ac	dditiona	al lines if	FGHRS	and/or V	VWHR	S app	lies, s	ee Ap	pend	ix G	<u>3)</u>						
(63)m=	0	0	0	0	0	C		0	0		0	0	0		C		(63)
WWHRS	-41.14	-36.19	-36.94	-30.43	-28.27	-23	.33 -	19.77	-23.9	93	-24.61	-30.41	-35.19	-39	).75		(63) (G10
Output	from w	ater hea	ter														
(64)m=	141.18	123.07	128.76	116.54	114.02	101	.99 1	100.3	109.	92	110.71	123.69	129.3	138	3.28		_
-			-						(	Outp	out from wa	ater heat	er (annual)	112		1437.75	(64)
Heat ga	ains fro	m water	heating,	kWh/mo	onth 0.2	25 ´ [C	.85 ×	(45)m	+ (6	1)m	] + 0.8 x	(46)m	n + (57)m	+ (5	59)m	]	
(65)m=	56.77	49.61	51.53	45.55	44.02	38.	62 3	36.77	41.2	22	41.68	47.67	51.11	55	.35		(65)
inclu	de (57)	m in calo	culation of	of (65)m	only if	cylind	er is ir	n the c	lwelli	ng	or hot wa	ater is	from com	mur	ity h	eating	
5. Inte	ernal g	ains (see	e Table 5	5 and 5a	):												
Metabo	olic aair	ns (Table	e 5). Wat	ts													
[	Jan	Feb	Mar	Apr	May	Ju	ın	Jul	Αι	ıg	Sep	Oct	Nov		)ec		
(66)m=	103.12	103.12	103.12	103.12	103.12	103	.12 1	03.12	103.	12	103.12	103.12	103.12	103	3.12		(66)
Lighting	g gains	(calcula	ted in Ap	pendix	L, equa	tion L	9 or L	9a), a	so se	ee T	Fable 5		•				
(67)m=	16.1	14.3	11.63	8.8	6.58	5.5	6	6	7.8	3	10.47	13.3	15.52	16	.54		(67)
Appliar	nces ga	ins (calc	ulated ir	Append	dix L, eo	uatio	n L13	or L1	3a), a	also	see Tal	ole 5	•			1	
(68)m=	180.2	182.07	177.35	167.32	154.66	142	.76 1	34.81	132.	94	137.65	147.68	160.35	172	2.25		(68)
Cookin	g gains	, calcula	ted in A	ppendix	L, equa	tion l	.15 or	L15a)	, also	) SE	e Table	5				1	
(69)m=	33.31	33.31	33.31	33.31	33.31	33.		, 33.31	33.3		33.31	33.31	33.31	33	.31		(69)
، Pumps	and fa	ns gains	(Table 5	5a)												1	
(70)m=	3	3	3	3	3	3		3	3		3	3	3		3		(70)
Losses	e.a. ev	/aporatio	n (nega	tive valu	es) (Tal	ole 5)							1	1		1	
(71)m=	-82.49	-82.49	-82.49	-82.49	-82.49	-82		82.49	-82.4	49	-82.49	-82.49	-82.49	-82	2.49		(71)
Water I	heating	ı gains (T	able 5)										1			1	
(72)m=	76.31	73.82	69.26	63.26	59.17	53.	64 4	49.43	55.	4	57.89	64.07	70.98	74	.39		(72)
		l gains =	l					+ (67)m	+ (68	)m +	- (69)m + (	70)m + (	 71)m + (72	)m		1	
(73)m=		327.12	315.17	296.32	277.35	258	.89 2	47.17	253.	, 07	262.94	281.98	303.78	320	).12	]	(73)
	ar gain					1	<b>I</b>							1		]	
			using sola	r flux from	Table 6a	and a	ssociate	ed equa	tions t	о со	nvert to th	e applica	ble orienta	tion.			
Orienta	ation:	Access F	actor	Area			Flux				g_		FF			Gains	
	-	Table 6d		m²			Table	e 6a		Т	able 6b	-	Fable 6c			(W)	
Southea	ast <mark>0.9x</mark>	0.77	x	1.5	2	x	36.7	79	x		0.35	<b>x</b>	0.8		=	10.85	(77)
Southea	ast <mark>0.9x</mark>	0.77	x	1.5		×	62.6	67	x		0.35	× [	0.8		=	18.48	(77)

х

x

1.52

1.52

85.75

106.25

х

x

0.35

0.35

х

x

0.8

0.8

=

=

X

x

0.77

0.77

Southeast 0.9x

Southeast 0.9x

(77)

(77)

25.29

31.34

а. н Г											_				
Southeast 0.9x	0.77	X	1.5	2	x	11	19.01	x		0.35	x	0.8	=	35.	1 (77)
Southeast 0.9x	0.77	x	1.5	2	x	11	18.15	x		0.35	x	0.8	=	34.8	5 (77)
Southeast 0.9x	0.77	x	1.5	2	x	11	13.91	x		0.35	x	0.8	=	33.	6 (77)
Southeast 0.9x	0.77	x	1.5	2	x	1(	)4.39	x		0.35	x	0.8	=	30.7	'9 (77)
Southeast 0.9x	0.77	x	1.5	2	x	9	2.85	x		0.35	x	0.8	=	27.3	9 (77)
Southeast 0.9x	0.77	x	1.5	2	x	6	9.27	x		0.35	x	0.8	=	20.4	3 (77)
Southeast 0.9x	0.77	x	1.5	2	x	4	4.07	x		0.35	x	0.8	=	13	(77)
Southeast 0.9x	0.77	x	1.5	2	x	3	1.49	x		0.35	x	0.8	=	9.2	9 (77)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	3	6.79	]		0.35	x	0.8	=	16.0	6 (79)
Southwest0.9x	0.77	x	2.2	5	x	6	2.67	]		0.35	x	0.8	=	27.3	6 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	8	5.75	]		0.35	x	0.8	=	37.4	4 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	1(	)6.25	]		0.35	x	0.8	=	46.3	9 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	11	19.01	]		0.35	x	0.8	=	51.9	6 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	11	18.15	Ī		0.35	x	0.8	_ =	51.5	68 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	11	13.91	Ī		0.35	x	0.8	=	49.7	'3 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	1(	)4.39	]		0.35	x	0.8	=	45.5	i8 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	9	2.85	İ		0.35	x	0.8	=	40.5	64 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	6	9.27	Ī		0.35	x	0.8	=	30.2	24 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	4	4.07	i		0.35	×	0.8	=	19.2	.4 (79)
Southwest <sub>0.9x</sub>	0.77	x	2.2	5	x	3	1.49	İ		0.35	x	0.8	=	13.7	'5 (79)
Northwest 0.9x	0.77	x	7.9	2	x	1	1.28	x		0.35	x	0.8	=	17.3	34 (81)
Northwest 0.9x	0.77	x	7.9	2	x	2	2.97	×		0.35	×	0.8	=	35.	3 (81)
Northwest 0.9x	0.77	x	7.9	2	x	4	1.38	x		0.35	x	0.8	=	63.5	i9 (81)
Northwest 0.9x	0.77	x	7.9	2	x	6	7.96	×		0.35	x	0.8	=	104.	43 (81)
Northwest 0.9x	0.77	x	7.9	2	x	9	1.35	×		0.35	×	0.8	=	140.	38 (81)
Northwest 0.9x	0.77	x	7.9	2	x	9	7.38	×		0.35	x	0.8	=	149.	66 (81)
Northwest 0.9x	0.77	x	7.9	2	x	ç	91.1	x		0.35	×	0.8	=	140	) (81)
Northwest 0.9x	0.77	x	7.9	2	x	7	2.63	x		0.35	x	0.8	=	111.	61 (81)
Northwest 0.9x	0.77	x	7.9	2	x	5	0.42	x		0.35	x	0.8	=	77.4	9 (81)
Northwest 0.9x	0.77	x	7.9	2	x	2	8.07	x		0.35	×	0.8	= =	43.1	3 (81)
Northwest 0.9x	0.77	x	7.9	2	x	1	4.2	x		0.35	×	0.8	=	21.8	32 (81)
Northwest 0.9x	0.77	x	7.9	2	x	ę	9.21	x		0.35	×	0.8	=	14.1	6 (81)
L								1							
Solar gains in	watts, cal	lculated	for each	n month	۱			(83)m	1 = St	um(74)m	(82)m				
(83)m= 44.26	81.14	126.32	182.16	227.44	2	36.09	223.33	187	.98	145.41	93.8	54.06	37.19	]	(83)
Total g <mark>ains – i</mark>	nternal ar	nd solar	(84)m =	(73)m	+ (8	33)m	watts							_	
(84)m= 373.79	408.26	441.5	478.48	504.79	49	94.98	470.51	441	.05	408.36	375.79	357.84	357.31		(84)
7. Mean inter	rnal tempe	erature (	heating	seaso	า)										
Temperature	during he	eating pe	eriods in	the liv	ing	area f	rom Tab	ole 9	, Th′	1 (°C)				21	(85)
Utilisation fac	ctor for ga	ins for li	iving are	a, h1,n	n (s	ee Ta	ble 9a)							L	I
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	]	
(86)m= 1	1	0.99	0.97	0.91	(	).75	0.58	0.6	64	0.88	0.98	1	1	1	(86)
L	· ·				•			•	1			•		-	

Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.9	20.02	20.23	20.52	20.79	20.95	20.99	20.98	20.87	20.54	20.17	19.88		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	able 9, Tl	h2 (°C)		-			
(88)m=	20.05	20.05	20.05	20.06	20.07	20.07	20.07	20.08	20.07	20.07	20.06	20.06		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)			-			
(89)m=	1	1	0.99	0.96	0.87	0.67	0.47	0.52	0.82	0.97	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ing T2 (fe	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	18.58	18.75	19.06	19.48	19.85	20.04	20.07	20.07	19.96	19.52	18.99	18.56		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.34	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	19.03	19.18	19.45	19.83	20.16	20.34	20.38	20.38	20.27	19.87	19.39	19		(92)
Apply	adjustn	nent to t	he mear	n interna	l temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.03	19.18	19.45	19.83	20.16	20.34	20.38	20.38	20.27	19.87	19.39	19		(93)
8. Sp	ace hea	ting requ	uirement											
			ternal ter			ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	ulate	
the ut			or gains	<u> </u>										
L LCP -	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
			ains, hm	i	0.00	0.7	0.5	0.50	0.02	0.07	0.00			(94)
(94)m=	1	0.99	0.99	0.96	0.88	0.7	0.5	0.56	0.83	0.97	0.99	1	I	(94)
(95)m=	ii gains, 372.48	405.72	, W = (94 435.31	4)m x (84 458.73	4)m 442.53	345	237.59	247.52	339.76	364.35	355.38	356.33		(95)
							237.59	247.52	339.70	304.33	355.36	300.33	I	(00)
(96)m=	4.3	4.9	ernal tem	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		-	an intern								7.1	7.2		(00)
(97)m=	964.47	932.68	843.95	704.16	543.92	365.34	240.4	252.42	394.01	595.4	793.08	960		(97)
			ement fo									000		()
(98)m=	440.44	354.12	304.03	176.71	75.44	0	0			171.9	315.15	449.13		
(00)						Ů	Ů	-	l per year				2286.91	(98)
0								1014	i por your	(1111#)001	) – Cam(c	<b>C</b> )15,912 -		
Space	e heatin	g require	ement in	kvvh/m-	/year								36.36	(99)
9a. En	ergy rec	luiremer	nts – Ind	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
	e heatir	•			, .									<b>-</b>
	•		at from s			mentary							0	(201)
Fracti	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	– (201) =				1	(202)
Fracti	on of to	tal 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								89.5	(206)
Efficie	ency of s	seconda	ry/suppl	ementar	y heating	g system	n, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space	e heatin	g require	ement (c	alculate	d above)	)							-	
	440.44	354.12	304.03	176.71	75.44	0	0	0	0	171.9	315.15	449.13		
(211)m	n = {[(98	)m x (20	)4)] } x 1	00 ÷ (20	)6)									(211)
	492.11	395.67	339.7	197.44	, 84.29	0	0	0	0	192.06	352.12	501.82		
			<u> </u>			•		Tota	l (kWh/yea	ar) =Sum(2	211) <sub>15,1012</sub>	=	2555.21	(211)

Space heating fuel (secondary), kWh/month

= {[(98	)m x (20	01)] } 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) <sub>15,101</sub>	<u>_</u>	0	(215)
	heating		tor (aala											
Output	141.18	123.07	128.76	ulated al 116.54	114.02	101.99	100.3	109.92	110.71	123.69	129.3	138.28		
Efficier	ncy of w	ater hea	iter										89.5	(216)
(217)m=	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5		(217)
		-	kWh/m											
. ,	157.74	137.5	) <u>÷ (217)</u> 143.86	130.21	127.4	113.95	112.07	122.81	123.7	138.2	144.47	154.5		
								Tota	I = Sum(2	19a) <sub>112</sub> =			1606.42	(219)
	I totals									k	Wh/yea		kWh/year	
Space	heating	fuel use	ed, main	system	1								2555.21	
Water	heating	fuel use	d										1606.42	
Electric	city for p	oumps, f	ans and	electric	keep-ho	t								
centra	al heatin	g pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45		(230e)
Total e	electricity	/ for the	above, I	kWh/yea	r		sum of (230a)(230g) =						75	(231)
Electric	city for li	ghting											284.27	(232)
12a. (	CO2 em	issions -	– Individ	ual heati	ng syste	ems inclu	uding mi	cro-CHF	)					
							<b>ergy</b> /h/year			<b>Emiss</b> kg CO	<b>ion fac</b> 2/kWh	tor	<b>Emissions</b> kg CO2/yea	
Space	heating	(main s	ystem 1	)		(21	1) x			0.2	16	=	551.92	(261)
Space	heating	(second	dary)			(21	5) x			0.5	19	=	0	(263)
Water	heating					(219	9) x			0.2	16	=	346.99	(264)
Space	and wat	ter heati	ng			(26	1) + (262)	+ (263) + (	264) =				898.91	(265)
Electric	city for p	oumps, fa	ans and	electric	keep-ho	t (23 <sup>-</sup>	1) x			0.5	19	=	38.93	(267)
Electric	city for li	ghting				(232	2) x			0.5	19	=	147.54	(268)
Total C	CO2, kg/	year							sum o	of (265)(2	271) =		1085.37	(272)
Dwelli	ng CO2	Emissi	on Rate	•					(272)	÷ (4) =			17.26	(273)
El ratir	ng (secti	on 14)											87	(274)

# SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 18 May 2017

#### Property Details: Be Clean-Flat 7-2nd Floor

Dwelling type: Located in: Region: Cross ventilation pos Number of storeys: Front of dwelling face Overshading: Overhangs: Thermal mass parame Night ventilation: Blinds, curtains, shut Ventilation rate during Overheating Details:	es: eter: ters:	ner (acl	n):	False	t • unknown	e time)		
Summer ventilation h Transmission heat los Summer heat loss co	ss coefficie		nt:	149.45 36.3 185.76				(P1) (P2)
Overhangs:								
<b>Orientation:</b> North West (Lounge ter South West (Bedroom) South East (Bedroom)		) (	2_overhangs: 0.79 0.64					
Solar shading:								
Orientation				_				
Orientation:	Z blinds:	5	Solar access:	Over	hangs:	Z summer:		
North West (Lounge tel South West (Bedroom) South East (Bedroom)	rraice doors)	) () ()	<b>iolar access:</b> 1.9 1.9 1.9	<b>Over</b> 0.79 0.64 1	hangs:	<b>Z summer:</b> 0.69 0.54 0.9		(P8) (P8) (P8)
North West (Lounge ter South West (Bedroom)	rraice doors) 1	) () ()	1.9 1.9	0.79 0.64	hangs:	0.69 0.54		(P8)
North West (Lounge ter South West (Bedroom) South East (Bedroom)	rraice doors) 1 1	) () ()	1.9 1.9	0.79 0.64	hangs: FF	0.69 0.54	Gains	(P8)
North West (Lounge ter South West (Bedroom) South East (Bedroom) Solar gains: Orientation North West (Lounge ter South West (Bedroom) South East (Bedroom)	rraîce doors) 1 1 rraîce doors) 0.9 x	) () () () () () () () () () () () () () (	1.9 1.9 1.9	0.79 0.64 1	-	0.69 0.54 0.9	<b>Gains</b> 146.07 38.69 43.77 228.53	(P8) (P8)
North West (Lounge ter South West (Bedroom) South East (Bedroom) Solar gains: Orientation North West (Lounge ter South West (Bedroom)	rraîce doors) 1 1 rraîce doors) 0.9 x	) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.9 0.9 <b>Flux</b> 105.45 126.97	0.79 0.64 1 <b>9</b> _ 0.35 0.35	<b>FF</b> 0.8 0.8	0.69 0.54 0.9 <b>Shading</b> 0.69 0.54 0.9	146.07 38.69 43.77	(P8) (P8)
North West (Lounge ter South West (Bedroom) South East (Bedroom) Solar gains: Orientation North West (Lounge ter South West (Bedroom) South East (Bedroom)	rraîce doors) 1 1 rraîc <del>0</del> doors) 0.9 x 0.9 x temperatur ture increm	) 0 0 0 7.92 2.25 1.52 re (Sou ent	9.9 9.9 <b>Flux</b> 105.45 126.97 126.97	0.79 0.64 1 0.35 0.35 0.35 0.35 <b>Ju</b> 37 61 3.3 d) 15 0.2 18	FF 0.8 0.8 0.8 0.8 1.29 5.67 31 .4	0.69 0.54 0.9 <b>Shading</b> 0.69 0.54 0.9	146.07 38.69 43.77	(P8) (P8) (P3/P4)