		User <u></u>	Details:						
Assessor Name: Software Name:	Natalie Wheeler Stroma FSAP 2012		Strom Softwa					0027778 on: 1.0.4.6	
		Property	Address	: Be Cle	an-Flat	13 - 3rd	floor		
Address:	Flat 13, Hampshire street								
1. Overall dwelling dime	ensions:	Δτο	a(m²)		Δν Ηρ	ight(m)		Volume(m ³	3)
Ground floor				(1a) x		2.4	(2a) =	190.39	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	79.33	(4)	L		_		
Dwelling volume		′ 📖		l)+(3c)+(3c	d)+(3e)+	(3n) =	190.39	(5)
2. Ventilation rate:								130.33	
2. Ventuation rate.	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating bearing heating	- + -	0] = Г	0	X	40 =	0	(6a)
Number of open flues	0 + 0	╡ + ト	0	_ 	0	x	20 =	0	(6b)
Number of intermittent fa	ins			_	2	X	10 =	20	(7a)
Number of passive vents				L	0	x	10 =	0	(7b)
Number of flueless gas f				L	0	x	40 =	0	(7c)
realiser of fideless gas fi					0			0	(10)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)$	7a)+(7b)+	(7c) =		20		÷ (5) =	0.11	(8)
	peen carried out or is intended, procee	ed to (17),	otherwise o	continue fi	rom (9) to	(16)			_
Number of storeys in the Additional infiltration	ne aweiling (ns)					[(9)]	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fo	r masoni	ry consti	ruction	[(0)	-1]X0.1 =	0	(11)
if both types of wall are p	resent, use the value corresponding t			•					` ′
deducting areas of opening	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or 0) 1 (seal	ed) else	enter 0				0	(12)
If no draught lobby, en	,	(ocan	ou), 0.00	ornor o				0	(13)
• • • • • • • • • • • • • • • • • • • •	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic metro	•		•	etre of e	envelope	area	5	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$ es if a pressurisation test has been do				io boing u	and.		0.36	(18)
Number of sides sheltere		ne or a de	gree air pe	ппеаышу	is being u	seu		2	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18) x (20) =				0.3	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
					ь		1	J	

Adjusted infiltr	ation rate (allow	vina for sl	nelter an	ıd wind s	:need) =	(21a) x	(22a)m					
0.38	0.38 0.37	0.33	0.32	0.29	0.29	0.28	0.3	0.32	0.34	0.35]	
	ctive air change	1		cable ca	se	<u> </u>	<u>!</u>	<u>!</u>		<u> </u>]	
If mechanica											0	(23a)
	eat pump using App) = (23a)			0	(23b)
If balanced with	heat recovery: effi	ciency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balance	d mechanical v	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (2	23b) × [′	1 – (23c)) ÷ 100]	
(24a)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24a)
· -	d mechanical v	entilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (2	23b)		1	
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24b)
,	ouse extract ve		•	•				- (00)				
<u> </u>	$1 < 0.5 \times (23b)$	· ` `	ŕ	ŕ		ŕ	ŕ	· ` ·			1	(24a)
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
,	ventilation or wl n = 1, then (24d		•	•				0.5]			_	
(24d)m= 0.57	0.57 0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
Effective air	change rate - e	nter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)				_	
(25)m= 0.57	0.57 0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
3 Heat losse	s and heat loss	paramet	er.									
ELEMENT	Gross	Openir		Net Ar	ea	U-val	ue	AXU		k-value	9	ΑΧk
	area (m²)	'n		A ,r		W/m2		(W/ł	<)	kJ/m²•		kJ/K
Doors				1.87	Х	1	=	1.87				(26)
Windows Type	: 1			5.04	x1.	/[1/(1.4)+	0.04] =	6.68				(27)
Windows Type	2			4.96	x1.	/[1/(1.4)+	0.04] =	6.58				(27)
Windows Type	3			2.3	x1.	/[1/(1.4)+	0.04] =	3.05				(27)
Windows Type	<u>.</u> 4			2.3	x1.	/[1/(1.4)+	0.04] =	3.05				(27)
Walls	78.1	16.4	7	61.63	3 x	0.18	□ -i	11.09				(29)
Roof	79.33	0	=	79.33	3 x	0.11	-	8.73	T i		7 F	(30)
Total area of e	lements, m ²			157.4	3							(31)
Party wall				24.1	x	0		0	п г			(32)
Party floor				79.33							7 H	(32a)
* for windows and	roof windows, use			alue calcul		ı formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragrapl	 n 3.2	((===)
	as on both sides of R is, $W/K = S(A)$		is ariu par	uuoris		(26)(30)) + (32) =				44.05	(33)
Heat capacity	•	(0)				(-) ()		(30) + (32	2) + (32a)	(32e) =	41.05	(34)
	parameter (TM	P = Cm -	- TFΔ) ir	n k.l/m²K			., ,	itive Value:	, , ,	(020) =		(35)
	sments where the d		,			ecisely the				able 1f	250	(55)
· ·	ad of a detailed cal					, , ,						
Thermal bridge	es : S (L x Y) ca	lculated	using Ap	pendix I	<						13.13	(36)
	al bridging are not k	nown (36) :	= 0.15 x (3	11)			(0.5)	(0.0)				 1.
Total fabric he		1 21						(36) =	os) (***		54.17	(37)
	t loss calculate	1	<u> </u>					$= 0.33 \times ($			1	
Jan	Feb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	

(38) ~ 36.07	35.89	25 74	34.88	34.72	34	34	22.06	34.28	34.72	25.04	25.26		(38)
(38)m= 36.07		35.71	34.00	34.72	34	34	33.86	l		35.04	35.36		(30)
Heat transfer (39)m= 90.24	90.06	1t, VV/K 89.88	89.05	88.89	88.17	88.17	88.04	88.45	= (37) + (3 88.89	89.21	89.54		
(55)111= 55.24	30.00	03.00	05.05	00.00	00.17	00.17	00.04			Sum(39) ₁		89.05	(39)
Heat loss para	meter (H	HLP), W	m²K		_				= (39)m ÷				
(40)m= 1.14	1.14	1.13	1.12	1.12	1.11	1.11	1.11	1.11	1.12	1.12	1.13		_
Number of day	e in mo	nth (Tah	(12 ما					•	Average =	Sum(40) ₁	12 /12=	1.12	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
		l .			<u> </u>		Į						
4. Water heat	ting ene	rav reaui	irement:								kWh/ye	ear:	
												, carr	
Assumed occu if TFA > 13.9			[1 - exn	(-0 0003	849 v (TE	-Δ -13 0	1211 + 0 (1013 x (Γ F Δ -13		.45	I	(42)
if TFA £ 13.9		1 1.70 X	i cxp	(0.0000	7-5 X (11	A 10.5	<i>)</i> 2)] 1 0.0) X 610	11 / 15.	.5)			
Annual averag									o toract o		2.39		(43)
Reduce the annua							io acriieve	a water us	se largel o	1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in			<u> </u>			<u> </u>				1.101			
(44)m= 101.63	97.93	94.24	90.54	86.84	83.15	83.15	86.84	90.54	94.24	97.93	101.63		
									Γotal = Su	m(44) ₁₁₂ =	=	1108.66	(44)
Energy content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 150.71	131.81	136.02	118.58	113.78	98.19	90.98	104.41	105.65	123.13	134.4	145.95		_
If instantaneous w	ater heati	na at noint	of use (no	hot water	r storage)	enter () in	hoxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1453.62	(45)
(46)m= 22.61	19.77	20.4	17.79	17.07	14.73	13.65	15.66	15.85	18.47	20.16	21.89		(46)
Water storage	l -	20.4	17.73	17.07	14.73	13.03	13.00	13.03	10.47	20.10	21.09		(10)
Storage volum	e (litres)	includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	_			_			. ,						
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage a) If manufact		eclared l	oss facto	or is kno	wn (kWł	n/day).					0		(48)
Temperature f					(., u.u.y / .					0		(49)
Energy lost fro				ear			(48) x (49)) =			0		(50)
b) If manufact		•			or is not	known:							()
Hot water stor	_			e 2 (kW	h/litre/da	ıy)					0		(51)
If community had Volume factor	•		on 4.3								0		(52)
Temperature f			2b							-	0		(52) (53)
Energy lost fro				ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (-	,				. , (= .)	. (- / (,		0		(55)
Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41):	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
								I					

Primar	y circuit	loss (an	nual) fro	om Table	∌ 3							0		(58)
	-				,	(59)m = (. ,	, ,					1	
,						solar wat					 		I	(==)
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
				ı i	ì	(60) ÷ 36	<u>`</u>					1	1	
(61)m=	50.96	45.08	48.02	44.65	44.26	41.01	42.37	44.26	44.65	48.02	48.29	50.96		(61)
Total h								`		` ′	ì	`	(59)m + (61)m	
(62)m=	201.67	176.89	184.04	163.23	158.04	139.19	133.36	148.66	150.3	171.15	182.7	196.91		(62)
						KH (negativ				r contributi	ion to wate	er heating)		
•	dditional 0		FGHRS			applies,		pendix C			Π_0		I	(63)
(63)m=	ا	-41.82		25.13	33.63	26.02	22.70		0	0 35.00	0	0 45.04		(63) (G10)
	5 -47.53	-	-42.69	-35.13	-32.63	-26.92	-22.79	-27.59	-28.39	-35.09	-40.64	-45.94		(63) (610)
•	from wa		ter 141.35	129.1	125.41	112.27	110.56	121.07	121.91	136.06	142.06	150.97	l	
(64)m=	154.13	135.06	141.55	128.1	125.41	112.21	110.56				r (annual) ₁	<u> </u>	1578.97	(64)
⊔oat o	oine fron	~ woter	booting	M/h/m	anth () 2	E ' [N QE	~ (45)m				,](04)
(65)m=	62.85	55.1	neating, 57.23	50.59	48.9	5 [0.85 42.9	× (45)m	45.78	1] + 0.8 X	52.95	+ (57)m 56.76	+ (59)m _{61.27}] 	(65)
	LI											munity h	cating	(66)
					-	yiinueria	s III u ie c	Jweiling	OI HOL W	alei is ii	OIII COM	Murilly 11	eaung	
1	Ĭ	·		5 and 5a)):									
Metab			5), Watt		May	Lin		Λ.ια	San	Cot	T Nov	Dag]	
(66)m=	Jan 147	Feb 147	Mar 147	Apr 147	May 147	Jun 147	Jul 147	Aug 147	Sep 147	Oct	Nov 147	Dec 147		(66)
			<u> </u>	<u> </u>			ļ.			177	177	17'		(55)
(67)m=	48.72	43.28	35.19	26.64	L, equati	ion L9 or 16.81	18.17	23.62	31.7	40.25	46.97	50.08		(67)
						uation L					40.07	00.00		(6.)
(68)m=	325.42	328.8	320.29	302.18	279.31	257.81	243.46	240.08	248.59	266.7	289.57	311.07		(68)
											200.01	011.07		(65)
(69)m=	19 gains 52.15	52.15	52.15	52.15	52.15	tion L15	52.15	52.15	52.15	52.15	52.15	52.15		(69)
, ,			(Table 5		02.10	02.10	02.10	02.10	02.10	02.10	02.10	02.10		(55)
(70)m=	3	3 3	3	3 3	3	3	3	3	3	3	3	3	1	(70)
, ,			<u> </u>	Ll tive value		<u> </u>				Ŭ.				(/
(71)m=	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98	1	(71)
	heating						.			.				()
(72)m=	84.48	81.99	76.92	70.27	65.72	59.58	54.9	61.53	64.29	71.16	78.84	82.35		(72)
, ,	nternal						<u> </u>	<u> </u>		<u> </u>	(1)m + (72)	ļ		,
(73)m=		558.22	536.56	503.24	469.1	438.36	420.68	429.38	448.73	482.27	519.54	547.65		(73)
	lar gains													
			using sola	r flux from	Table 6a	and associ	iated equa	itions to co	nvert to th	e applicat	ole orientat	tion.		
Orienta	ation: A			Area		Flu		т	g_	т.	FF		Gains	
	_	able 6d		m²		l au	ble 6a	. <u> </u>	able 6b		able 6c		(W)	_
Southe	ast _{0.9x}	0.77	X	2.3	3	x 3	86.79	X	0.35	x	8.0	=	16.42	(77)

Southoost of C		1		1		1		ı		1		7,
Southeast 0.9x	0.77	X	2.3	X	62.67	X	0.35	X	0.8	=	27.97	(77)
Southeast 0.9x	0.77	X	2.3	X	85.75	X	0.35	X	0.8	=	38.27	(77)
Southeast 0.9x	0.77	X	2.3	X	106.25	X	0.35	X	0.8	=	47.42	<u> </u> (77)
Southeast 0.9x	0.77	X	2.3	X	119.01	X	0.35	X	0.8	=	53.11	(77)
Southeast 0.9x	0.77	X	2.3	X	118.15	X	0.35	X	0.8	=	52.73	(77)
Southeast 0.9x	0.77	X	2.3	X	113.91	X	0.35	X	0.8	=	50.84	(77)
Southeast 0.9x	0.77	X	2.3	X	104.39	Х	0.35	X	0.8	<u> </u>	46.59	(77)
Southeast 0.9x	0.77	X	2.3	X	92.85	X	0.35	X	0.8	=	41.44	(77)
Southeast _{0.9x}	0.77	X	2.3	X	69.27	X	0.35	X	0.8	=	30.91	(77)
Southeast 0.9x	0.77	X	2.3	X	44.07	X	0.35	X	0.8	=	19.67	(77)
Southeast _{0.9x}	0.77	X	2.3	X	31.49	X	0.35	X	0.8	=	14.05	(77)
Southwest _{0.9x}	0.77	X	2.3	X	36.79		0.35	X	0.8	=	16.42	(79)
Southwest _{0.9x}	0.77	X	2.3	X	62.67		0.35	X	0.8	=	27.97	(79)
Southwest _{0.9x}	0.77	X	2.3	X	85.75		0.35	X	0.8	=	38.27	(79)
Southwest _{0.9x}	0.77	X	2.3	X	106.25]	0.35	X	0.8	=	47.42	(79)
Southwest _{0.9x}	0.77	X	2.3	x	119.01]	0.35	x	0.8	=	53.11	(79)
Southwest _{0.9x}	0.77	X	2.3	x	118.15]	0.35	X	0.8	=	52.73	(79)
Southwest _{0.9x}	0.77	X	2.3	x	113.91		0.35	X	0.8	=	50.84	(79)
Southwest _{0.9x}	0.77	X	2.3	x	104.39]	0.35	x	0.8	=	46.59	(79)
Southwest _{0.9x}	0.77	x	2.3	x	92.85]	0.35	x	0.8	=	41.44	(79)
Southwest _{0.9x}	0.77	X	2.3	x	69.27]	0.35	x	0.8	=	30.91	(79)
Southwest _{0.9x}	0.77	x	2.3	x	44.07]	0.35	x	0.8	=	19.67	(79)
Southwest _{0.9x}	0.77	x	2.3	x	31.49]	0.35	x	0.8	=	14.05	(79)
Northwest _{0.9x}	0.77	X	5.04	x	11.28	x	0.35	x	0.8] =	11.03	(81)
Northwest _{0.9x}	0.77	x	4.96	x	11.28	x	0.35	x	0.8	=	10.86	(81)
Northwest _{0.9x}	0.77	x	5.04	x	22.97	x	0.35	x	0.8	=	22.46	(81)
Northwest _{0.9x}	0.77	X	4.96	x	22.97	x	0.35	x	0.8	j =	22.1	(81)
Northwest _{0.9x}	0.77	x	5.04	x	41.38	x	0.35	x	0.8	=	40.47	(81)
Northwest _{0.9x}	0.77	×	4.96	x	41.38	x	0.35	x	0.8	=	39.82	(81)
Northwest 0.9x	0.77	X	5.04	x	67.96	x	0.35	x	0.8	j =	66.46	(81)
Northwest _{0.9x}	0.77	x	4.96	x	67.96	x	0.35	x	0.8	=	65.4	(81)
Northwest _{0.9x}	0.77	x	5.04	x	91.35	х	0.35	х	0.8	j =	89.33	(81)
Northwest 0.9x	0.77	x	4.96	x	91.35	x	0.35	х	0.8	j =	87.91	(81)
Northwest _{0.9x}	0.77	x	5.04	x	97.38	x	0.35	х	0.8	j =	95.24	(81)
Northwest _{0.9x}	0.77	x	4.96	x	97.38	х	0.35	х	0.8	j =	93.73	(81)
Northwest _{0.9x}	0.77	x	5.04	x	91.1	x	0.35	x	0.8	j =	89.09	(81)
Northwest _{0.9x}	0.77	×	4.96	x	91.1	x	0.35	x	0.8	i =	87.68	(81)
Northwest _{0.9x}	0.77	×	5.04	×	72.63	x	0.35	x	0.8	=	71.03	(81)
Northwest _{0.9x}	0.77	X	4.96	X	72.63	X	0.35	X	0.8	=	69.9	(81)
Northwest _{0.9x}	0.77	X	5.04	X	50.42	X	0.35	X	0.8	=	49.31	(81)
Northwest _{0.9x}	0.77	X	4.96	X	50.42	X	0.35	X	0.8	=	48.53	(81)
L_		_		1		1		1				`

Northwe	est _{0.9x}	0.77	X	5.0)4	x	2	28.07	X		0.35	x	0.8	=	27.45	(81)
Northwe	est _{0.9x}	0.77	х	4.9	96	x	2	28.07	х		0.35	x	0.8		27.01	(81)
Northwe	est _{0.9x}	0.77	X	5.0)4	x		14.2	х		0.35	x	0.8	=	13.88	(81)
Northwe	est _{0.9x}	0.77	X	4.9	96	x		14.2	х		0.35	x	0.8	=	13.66	(81)
Northwe	est _{0.9x}	0.77	x	5.0)4	x	,	9.21	x		0.35	_ x [0.8		9.01	(81)
Northwe	est _{0.9x}	0.77	х	4.9	96	x	9	9.21	x		0.35	_ x [0.8	=	8.87	(81)
	_					ļ										
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m	n = Si	um(74)m .	(82)m				
(83)m=	54.73	100.51	156.83	226.7	283.47	29	94.42	278.45	234	4.1	180.71	116.29	66.88	45.98		(83)
Total gains – internal and solar (84)m = (73)m + (83)m , watts													•			
(84)m=	617.51	658.72	693.39	729.94	752.57	73	32.78	699.12	663	.48	629.45	598.56	586.42	593.63		(84)
7. Mea	an inter	nal temp	erature	(heating	season)							•			
				`		<i></i>	area i	from Tab	ole 9	Th	1 (°C)				21	(85)
•		J	٠.	living are		•			,,,	,	. ()					(55)
	Jan	Feb	Mar	Apr	May	È	Jun	Jul	Δ	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98	0.95	0.87	\vdash	0.71	0.54	0.5	Ť	0.82	0.96	0.99	0.99		(86)
` ′ L			l	l	l .	<u> </u>		l .				0.00	0.00	0.00		(00)
г								ps 3 to 7		$\overline{}$					1	(a=)
(87)m=	19.94	20.05	20.26	20.54	20.8	2	0.95	20.99	20.	98	20.89	20.58	20.21	19.91		(87)
Tempe	erature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Tł	n2 (°C)					
(88)m=	19.97	19.97	19.97	19.98	19.98	1	9.99	19.99	19.	99	19.99	19.98	19.98	19.98		(88)
Utilisa	ition fac	tor for g	ains for	rest of d	welling,	h2,	m (se	ee Table	9a)							
(89)m=	0.99	0.99	0.97	0.93	0.83	_	0.62	0.42	0.4	17	0.75	0.94	0.98	0.99		(89)
Moon	intorna	Ltompor	atura in	the rest	of dwall	ina	T2 (f	ollow ste	nc 2	to 7	7 in Tabl	0.00)			1	
(90)m=	18.58	18.74	19.04	19.45	19.79		9.96	19.99	19.	_	19.9	19.51	18.98	18.54		(90)
(50)111=	10.00	10.74	10.04	10.40	10.70	<u> </u>	0.00	10.00	10.	00			ng area ÷ (4		0.32	(91)
													3 (,	0.32	(0.)
Г			· `	r	1	_		LA × T1	_ `				1	1	Ī	(00)
(92)m=	19.01	19.16	19.43	19.8	20.11		0.27	20.3	20		20.22	19.85	19.37	18.98		(92)
· · · · r			i	1		_		m Table		$\overline{}$			10.07	40.00	1	(02)
(93)m=	19.01	19.16	19.43	19.8	20.11	2	0.27	20.3	20	.3	20.22	19.85	19.37	18.98		(93)
•		ting requ				اء ما	a4 a4	an 11 af	Tabl	ام ۸		4 T:	(70)	ما مماد	loto	
				nperaturusing Ta		iea	at ste	ерттог	rabi	ie 9t	o, so tha	t 11,ff1=((76)m an	d re-caid	culate	
Ι	Jan	Feb	Mar	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
Utilisa		tor for g	<u> </u>	<u> </u>	11141					- 3	334		1		l	
(94)m=	0.99	0.98	0.97	0.93	0.83	(0.65	0.46	0.5	51	0.77	0.94	0.98	0.99		(94)
Useful	I gains,	hmGm .	, W = (9	4)m x (8	4)m	_									l	
(95)m=	610.62	647.71	672.24	678.97	627.59	47	75.68	323.17	337	.91	483.44	561.32	575.01	588.1		(95)
Month	ly avera	age exte	rnal tem	perature	from T	abl	e 8						•	•	1	
(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 lo	oss rate	e for mea	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(9	3)m-	– (96)m]			•	
(97)m=	1327.19	1283.91	1161.9	970.32	747.25	50	00.05	326.62	343	.51	540.87	822.28	1094.87	1323.13		(97)
Space	heatin	g require	ement fo	r each n	nonth, k	Wh	/mon	th = 0.02	4 x	(97)	m – (95)m] x (4	1)m		-	
(98)m=	533.13	427.53	364.31	209.77	89.03		0	0	C)	0	194.16	374.3	546.86		

					Tota	l per vear	(kWh/yeaı	·) – Sum(0	18) –	2739.08	(98)
Chase besting requiremen	t in 141/16/20	2/11005			1010	ii per year	(KVVII) y Cai) = Ouni(o	0)15,912		╡``
Space heating requiremen										34.53	(99)
9a. Energy requirements –	Individual h	eating s	ystems i	including	micro-C	CHP)					
Space heating: Fraction of space heat from	n secondar	v/supple	ementary	/ system						0	(201)
Fraction of space heat from			,	•	(202) = 1	- (201) =				1	(202)
Fraction of total heating from	•	` ,			(204) = (2	(02) × [1 –	(203)] =			1	(204)
Efficiency of main space h	-									89.5	(206)
Efficiency of secondary/su			g systen	n, %						0	(208)
Jan Feb M	· ·	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	∟ ear
Space heating requiremen	_				19]	
533.13 427.53 364	31 209.77	89.03	0	0	0	0	194.16	374.3	546.86]	
$(211)m = \{[(98)m \times (204)] \}$	x 100 ÷ (20	06)		_				_		_	(211)
595.68 477.68 407.	05 234.38	99.47	0	0	0	0	216.93	418.21	611.01		_
					Tota	al (kWh/yea	ar) =Sum(2	211) _{15,101}	2=	3060.42	(211)
Space heating fuel (secon	• /	/month									
$= \{[(98)m \times (201)] \} \times 100 \div (215)m = 0 0 0$	 	0	0	0	0	0	0	0	0	1	
(=:5)							ar) =Sum(2	_		0	(215)
Water heating											_
Output from water heater (c	alculated a	bove)			ı		T		·	1	
154.13 135.06 141.	35 128.1	125.41	112.27	110.56	121.07	121.91	136.06	142.06	150.97		– , .
Efficiency of water heater		T	T	T	T	T	T		T	89.5	(216)
(217)m= 89.5 89.5 89.		89.5	89.5	89.5	89.5	89.5	89.5	89.5	89.5]	(217)
Fuel for water heating, kWh $(219)m = (64)m \times 100 \div (219)m$											
(219)m= 172.22 150.91 157.		140.12	125.44	123.54	135.27	136.21	152.02	158.73	168.68		
					Tota	al = Sum(2	19a) ₁₁₂ =			1764.21	(219)
Annual totals	-:	4					k'	Wh/yea	r	kWh/yea	r ¬
Space heating fuel used, m	ain system	1								3060.42	╡
Water heating fuel used										1764.21	
Electricity for pumps, fans a	nd electric	keep-ho	t								
central heating pump:									30]	(2300
boiler with a fan-assisted f	ue								45]	(230
Total electricity for the above	e, kWh/yea	ar			sum	of (230a)	(230g) =			75	(231)
Electricity for lighting										344.18	(232)
10a. Fuel costs - individua	l heating sv	/stem <u>s:</u>									
	<u> </u>		Fu				Fuel P			Fuel Cost	
Onese heating week a few	1			Vh/year			(Table		v 0.04	£/year	
Space heating - main syste	n 1		(21	1) x			3.4	8	x 0.01 =	106.5	(240)

Space heating - main system 2	(213) x	0 x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19 x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48 × 0.01 =	61.39	(247)
Pumps, fans and electric keep-hot	(231)	13.19 × 0.01 =	9.89	(249)
(if off-peak tariff, list each of (230a) to (230	- ,	· · · · ·		,
Energy for lighting	(232)	13.19 x 0.01 =	45.4	(250)
Additional standing charges (Table 12)			120	(251)
Appendix Q items: repeat lines (253) and (253) and (253)	254) as needed 45)(247) + (250)(254) =		343.19	(255)
11a. SAP rating - individual heating system	ms			
Energy cost deflator (Table 12)			0.42	(256)
Energy cost factor (ECF) [(2	255) x (256)] ÷ [(4) + 45.0] =		1.16	(257)
SAP rating (Section 12)			83.83	(258)
12a. CO2 emissions – Individual heating s	systems including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x	0.216 =	661.05	(261)
Space heating (secondary)	(215) x	0.519 =	0	(263)
Water heating	(219) x	0.216 =	381.07	(264)
Space and water heating	(261) + (262) + (263) + (264) =	1042.12	(265)
Electricity for pumps, fans and electric keep	p-hot (231) x	0.519 =	38.93	(267)
Electricity for lighting	(232) x	0.519 =	178.63	(268)
Total CO2, kg/year		sum of (265)(271) =	1259.68	(272)
CO2 emissions per m²		(272) ÷ (4) =	15.88	(273)
El rating (section 14)			86	(274)
13a. Primary Energy				
	Energy kWh/year	Primary factor	P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.22	3733.71	(261)
Space heating (secondary)	(215) x	3.07	0	(263)
Energy for water heating	(219) x	1.22	2152.33	(264)
Space and water heating	(261) + (262) + (263) + (264) =	5886.05	(265)
Electricity for pumps, fans and electric keep	p-hot (231) x	3.07	230.25	(267)
Electricity for lighting	(232) x	0 =	1056.64	(268)
'Total Primary Energy		sum of (265)(271) =	7172.94	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =	90.42	(273)

			User D	etails: _						
Assessor Name:	Natalie Wheeler			Strom:	a Num	ber:		STRC	0027778	
Software Name:	Stroma FSAP 201	2		Softwa					on: 1.0.4.6	
							13 - 3rd f			
Address :	Flat 13, Hampshire									
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	ight(m)		Volume(m	3)
Ground floor			7	9.33	(1a) x	2	2.4	(2a) =	190.39	(3a)
Total floor area TFA = (1	1a)+(1b)+(1c)+(1d)+(1e	e)+(1n	7	9.33	(4)			_		<u> </u>
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	190.39	(5)
2. Ventilation rate:										
		econdar leating	у	other		total			m³ per hou	ır
Number of chimneys	0 +	0] + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0		0	i - F	0	x	20 =	0	(6b)
Number of intermittent fa	ans				,	2	x	10 =	20	(7a)
Number of passive vents	S				F	0	x	10 =	0	(7b)
·					Ļ			40 =		= '
Number of flueless gas f	rires				L	0	x ·	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimne	eys, flues and fans = (6	a)+(6b)+(7	a)+(7b)+(¹	7c) =	Г	20		÷ (5) =	0.11	(8)
	been carried out or is intende				ontinue fr			- (-)	0.11	(\``
Number of storeys in t	the dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timber	frame or	0.35 for	masonr	y constr	ruction			0	(11)
if both types of wall are pure deducting areas of open	oresent, use the value corres	ponding to	the great	er wall are	a (after					
•	floor, enter 0.2 (unseal	ed) or 0.	1 (seale	d), else	enter 0				0	(12)
If no draught lobby, er		,	`	,,					0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration	_			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value	, q50, expressed in cub	ic metre	s per ho	ur per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeab	ility value, then $(18) = [(1$	7) ÷ 20]+(8	3), otherwi	se (18) = (16)				0.36	(18)
Air permeability value appli	es if a pressurisation test has	s been don	e or a deg	gree air pe	rmeability	is being u	sed			
Number of sides shelter	ed			(00) 4	10 0 7 F (4	10)1			2	(19)
Shelter factor				(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorpora	-			(21) = (18)	(20) =				0.3	(21)
Infiltration rate modified		1				<u> </u>	<u> </u>		1	
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind s	· · · · · · · · · · · · · · · · · · ·			c =	_		· -	·-	1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7]	
Wind Factor (22a)m = (2	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]	
 									_	

Adjusted infiltr	ation rate	e (allowii	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.38	0.38	0.37	0.33	0.32	0.29	0.29	0.28	0.3	0.32	0.34	0.35]	
Calculate effect		•	ate for t	he appli	cable ca	se	-	-		-			(23
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	
If balanced with									, (===,			0	
a) If balance		-	-	_					2h)m + (23h) x [1	1 <i>– (23c</i>)		(23)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
b) If balance	d mecha	nical ve	ntilation	without	heat rec	coverv (N	//\/) (24h)m = (2)	2b)m + (;	L 23h)	<u>!</u>	J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
c) If whole h	ouse extr			•	•				5 x (23h))	1	J	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
d) If natural	ventilatio	n or who	ole hous	e nositiv	ve input	ventilatio	n from I	oft.			<u> </u>	J	
,	n = 1, the			•					0.5]			_	
(24d)m= 0.57	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56]	(24
Effective air	change r	ate - en	ter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-	_	
(25)m= 0.57	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56]	(25)
3. Heat losse	s and hea	at loss n	paramete	ār.									
ELEMENT	Gross area (s	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value		A X k kJ/K
Doors	`	,			1.87	X	1	=	1.87	,			(26)
Windows Type	. 1				5.04	x1,	/[1/(1.4)+	0.04] =	6.68				(27)
Windows Type	2				4.96	x1,	/[1/(1.4)+	0.04] =	6.58	=			(27)
Windows Type					2.3	x ₁ ,	/[1/(1.4)+	0.04] =	3.05				(27)
Windows Type					2.3	_	/[1/(1.4)+		3.05				(27)
Walls	78.1		16.4	7	61.63	=	0.18	'	11.09	=			(29)
Roof	79.33	=	0		79.33	=	0.10	=	8.73	ᆿ ¦		북 누	(30)
Total area of e						=	0.11		0.73				(31)
Party wall	iomonto,				157.4	=			0	— r			
Party floor					24.1	×	0	=	0				(32)
* for windows and	roof windo		ffootivo wi	ndow II v	79.33		i formula 1	/F/1/II vol	10) 10 041 0	L no airean in	norograni		(32
** include the area						aleu usiriy	TOTTIUIA T	/[(1/ O- vaic	<i>ie)</i> +0.04j a	is giveri iii	paragrapi	1 3.2	
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30)	+ (32) =				41.0	05 (33)
Heat capacity	Cm = S(A)	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	0	(34)
Thermal mass	paramet	er (TMP	e Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L)	x Y) cald	culated u	using Ap	pendix l	<						13.1	(36)
if details of therma Total fabric he		are not kno	own (36) =	= 0.15 x (3	11)			(33) +	· (36) =			54.1	17 (37)
Ventilation hea	at loss cal	Iculated	monthly	/				(38)m	= 0.33 × (25)m x (5))		

							1					I	
(38)m= 36.07	35.89	35.71	34.88	34.72	34	34	33.86	34.28	34.72	35.04	35.36		(38)
Heat transfer	coefficier	nt, W/K					,	(39)m	= (37) + (38)m		•	
(39)m= 90.24	90.06	89.88	89.05	88.89	88.17	88.17	88.04	88.45	88.89	89.21	89.54		7,
Heat loss par	ameter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39)₁ · (4)	12 /12=	89.05	(39)
(40)m= 1.14	1.14	1.13	1.12	1.12	1.11	1.11	1.11	1.11	1.12	1.12	1.13		_
Number of da	ve in moi	nth (Tab	lo 1a)					,	Average =	Sum(40) ₁	12 /12=	1.12	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
(11)	1	<u> </u>		<u> </u>		<u> </u>							,
4 \\/atox boo	4:00 000										LAMB /s c		
4. Water hea	iting enei	rgy requi	rement:								kWh/ye	ear:	
Assumed occ											.45		(42)
if TFA > 13 if TFA £ 13	-	+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
Annual avera	•	ater usac	ne in litre	s per da	av Vd av	erage =	(25 x N)	+ 36		92	2.39		(43)
Reduce the annu	al average	hot water	usage by	5% if the α	dwelling is	designed			se target o				(1-)
not more that 12:	5 litres per p	oerson per	· day (all w	ater use, l	hot and co	ld)			•	,		•	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres per	day for ea	ach month	Vd,m = fa	ctor from 7	Table 1c x	(43)					•	
(44)m= 101.63	97.93	94.24	90.54	86.84	83.15	83.15	86.84	90.54	94.24	97.93	101.63		_
Energy content o	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1108.66	(44)
45)m= 150.71	131.81	136.02	118.58	113.78	98.19	90.98	104.41	105.65	123.13	134.4	145.95		
	<u> </u>]]					-	Total = Su	m(45) ₁₁₂ =		1453.62	(45)
If instantaneous	water heatii	ng at point	of use (no) hot water	r storage),	enter 0 in	boxes (46) to (61)	_	_			
(46)m= 22.61	19.77	20.4	17.79	17.07	14.73	13.65	15.66	15.85	18.47	20.16	21.89		(46)
Nater storage		. :		-1 \^	/\// IDC	-4	itle i		1			1	
Storage volur	, ,		0 ,			Ü		ame ves	sei		0		(47)
lf community Otherwise if n	•			-			` '	ars) ante	ar 'O' in <i>(</i>	47)			
Water storage		not wate	/ (till ill	iciaacs i	iistaiitai	10003 00	ATTION DOIL	cra) crite) III (71)			
a) If manufac		eclared l	oss facto	or is kno	wn (kWr	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost fr	om water	· storage	, kWh/ye	ear			(48) x (49)) =			0		(50)
b) If manufac		_	-		or is not	known:							` ,
Hot water sto	_			e 2 (kW	h/litre/da	ıy)					0		(51)
f community	_		on 4.3									1	4
/olume facto remperature			. 2h								0		(52)
·							(47) (54)	(50) (50)		0		(53)
Energy lost fr Enter (50) or		_	, KVVN/ye	∍ar			(47) x (51)) X (52) X (53) =	-	0		(54)
Water storage	, , ,	,	for each	month			((56)m = (55) 🗸 (41):	m		0		(55)
	1						· · · · ·			_		Ī	(50)
(56)m= 0 If cylinder contain	0 os dedicate	d solar sto	0	0 = (56)m	0 x [(50) = (0 H11\1 ÷ (5	0) else (5	0 7)m = (56)	0 m where (0 H11) is fro	0 Append	liv H	(56)
ii cylinder contalf	is dedicate	น รบเลเ รเ0	raye, (57)ľ	m = (50)m	⊼ [(00) − (i i i i)] ÷ (5	oj, eise (5	,)III = (56)	ııı wnere (1111) IS IfC	m Append	IA []	
(57)m= 0													(57)

Primar	y circuit	loss (ar	nnual) fro	m Table	e 3							0		(58)
Primar	y circuit	loss cal	lculated t	for each	month ((59)m =	(58) ÷ 36	65 × (41)	m					
(mo	dified by	factor f	rom Tab	le H5 if t	here is	solar wa	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 each	month	(61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	50.96	45.08	48.02	44.65	44.26	41.01	42.37	44.26	44.65	48.02	48.29	50.96		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	201.67	176.89	184.04	163.23	158.04	139.19	133.36	148.66	150.3	171.15	182.7	196.91		(62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (3)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
WWHR	-47.53	-41.82	-42.69	-35.13	-32.63	-26.92	-22.79	-27.59	-28.39	-35.09	-40.64	-45.94		(63) (G1
Output	from w	ater hea	ater											
(64)m=	154.13	135.06	141.35	128.1	125.41	112.27	110.56	121.07	121.91	136.06	142.06	150.97		
					•		•	Outp	out from w	ater heate	r (annual) ₁	12	1578.97	(64)
Heat g	ains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	n + (61)m	n] + 0.8 x	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.85	55.1	57.23	50.59	48.9	42.9	40.85	45.78	46.29	52.95	56.76	61.27		(65)
inclu	ide (57)	m in cal	culation of	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ernal ga	ains (see	e Table 5	and 5a):									
Metab	olic gain	s (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	122.5	122.5	122.5	122.5	122.5	122.5	122.5	122.5	122.5	122.5	122.5	122.5		(66)
Lightin	g gains	(calcula	ited in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5			•	•	
(67)m=	19.49	17.31	14.08	10.66	7.97	6.73	7.27	9.45	12.68	16.1	18.79	20.03		(67)
Applia	nces ga	ins (calc	culated in	Append	dix L, eq	uation L	13 or L1	3a), alsc	see Ta	ble 5		•	•	
(68)m=	218.03	220.3	214.6	202.46	187.14	172.74	163.12	160.85	166.55	178.69	194.01	208.41		(68)
Cookir	ng gains	(calcula	ated in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5	•	•	•	
(69)m=	35.25	35.25	35.25	35.25	35.25	35.25	35.25	35.25	35.25	35.25	35.25	35.25		(69)
Pumps	and fai	ns gains	(Table 5	Ба)	ļ.				ļ.		ļ.			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	e.g. ev	aporatio	on (negat	tive valu	es) (Tab	le 5)			l					
(71)m=	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98	-98		(71)
Water	heating	gains (1	rable 5)											
(72)m=	84.48	81.99	76.92	70.27	65.72	59.58	54.9	61.53	64.29	71.16	78.84	82.35		(72)
Total i	nternal	gains =				(66))m + (67)m	n + (68)m +	+ (69)m +	(70)m + (7	1)m + (72))m		
(73)m=		382.35	368.35	346.13	323.57	301.79	288.03	294.58	306.28	328.71	354.39	373.55		(73)
6. So	lar gains	S:												
Solar	ains are o	calculated	using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	nvert to th	ne applicat	ole orientat	tion.		
Orienta		Access F		Area		Flu			g_		FF		Gains	
	٦	Table 6d		m²		Tal	ble 6a	Т	able 6b	Т	able 6c		(W)	
Southe	ast _{0.9x}	0.77	X	2.	3	x 3	86.79	x	0.35	×	0.8	=	16.42	(77)

0		7		1		1		1	_	1	Γ	-
Southeast 0.9x	0.77	X	2.3	X	62.67	X	0.35	Х	0.8	=	27.97	(77)
Southeast 0.9x	0.77	X	2.3	X	85.75	X	0.35	Х	0.8	=	38.27	<u> </u> (77)
Southeast 0.9x	0.77	X	2.3	X	106.25	X	0.35	X	0.8	=	47.42	(77)
Southeast _{0.9x}	0.77	X	2.3	X	119.01	X	0.35	X	0.8	=	53.11	(77)
Southeast _{0.9x}	0.77	X	2.3	X	118.15	X	0.35	Х	0.8	=	52.73	(77)
Southeast _{0.9x}	0.77	X	2.3	X	113.91	X	0.35	X	0.8	=	50.84	(77)
Southeast 0.9x	0.77	X	2.3	X	104.39	X	0.35	X	0.8	=	46.59	(77)
Southeast _{0.9x}	0.77	X	2.3	X	92.85	X	0.35	X	0.8	=	41.44	(77)
Southeast _{0.9x}	0.77	X	2.3	X	69.27	X	0.35	X	0.8	=	30.91	(77)
Southeast 0.9x	0.77	X	2.3	X	44.07	X	0.35	X	0.8	=	19.67	(77)
Southeast 0.9x	0.77	X	2.3	X	31.49	X	0.35	X	0.8	=	14.05	(77)
Southwest _{0.9x}	0.77	X	2.3	X	36.79		0.35	X	0.8	=	16.42	(79)
Southwest _{0.9x}	0.77	X	2.3	X	62.67]	0.35	X	0.8	=	27.97	(79)
Southwest _{0.9x}	0.77	X	2.3	X	85.75]	0.35	X	0.8	=	38.27	(79)
Southwest _{0.9x}	0.77	X	2.3	X	106.25]	0.35	x	0.8	=	47.42	(79)
Southwest _{0.9x}	0.77	x	2.3	x	119.01]	0.35	x	0.8	=	53.11	(79)
Southwest _{0.9x}	0.77	x	2.3	x	118.15]	0.35	x	0.8	=	52.73	(79)
Southwest _{0.9x}	0.77	x	2.3	x	113.91]	0.35	х	0.8	=	50.84	(79)
Southwest _{0.9x}	0.77	х	2.3	x	104.39]	0.35	х	0.8] =	46.59	(79)
Southwest _{0.9x}	0.77	х	2.3	x	92.85		0.35	х	0.8] =	41.44	(79)
Southwest _{0.9x}	0.77	X	2.3	x	69.27		0.35	х	0.8	=	30.91	(79)
Southwest _{0.9x}	0.77	x	2.3	x	44.07]	0.35	x	0.8	=	19.67	(79)
Southwest _{0.9x}	0.77	x	2.3	X	31.49		0.35	х	0.8	=	14.05	(79)
Northwest _{0.9x}	0.77	x	5.04	x	11.28	x	0.35	x	0.8	=	11.03	(81)
Northwest _{0.9x}	0.77	x	4.96	x	11.28	x	0.35	x	0.8	=	10.86	(81)
Northwest _{0.9x}	0.77	x	5.04	x	22.97	x	0.35	x	0.8	=	22.46	(81)
Northwest _{0.9x}	0.77	x	4.96	X	22.97	x	0.35	x	0.8	=	22.1	(81)
Northwest _{0.9x}	0.77	x	5.04	X	41.38	x	0.35	x	0.8	=	40.47	(81)
Northwest _{0.9x}	0.77	X	4.96	X	41.38	X	0.35	x	0.8] =	39.82	(81)
Northwest 0.9x	0.77	x	5.04	x	67.96	x	0.35	x	0.8] =	66.46	(81)
Northwest _{0.9x}	0.77	x	4.96	x	67.96	x	0.35	x	0.8	=	65.4	(81)
Northwest _{0.9x}	0.77	x	5.04	x	91.35	x	0.35	x	0.8	=	89.33	(81)
Northwest 0.9x	0.77	x	4.96	x	91.35	х	0.35	х	0.8	=	87.91	(81)
Northwest _{0.9x}	0.77	х	5.04	x	97.38	x	0.35	х	0.8	=	95.24	(81)
Northwest 0.9x	0.77	x	4.96	x	97.38	x	0.35	x	0.8	=	93.73	(81)
Northwest _{0.9x}	0.77	x	5.04	x	91.1	x	0.35	x	0.8] =	89.09	(81)
Northwest _{0.9x}	0.77	x	4.96	x	91.1	x	0.35	x	0.8] =	87.68	(81)
Northwest _{0.9x}	0.77	x	5.04	x	72.63	x	0.35	х	0.8	=	71.03	(81)
Northwest _{0.9x}	0.77	x	4.96	x	72.63	x	0.35	х	0.8	j =	69.9	(81)
Northwest _{0.9x}	0.77	x	5.04	x	50.42	x	0.35	х	0.8	=	49.31	(81)
Northwest _{0.9x}	0.77	x	4.96	x	50.42	x	0.35	x	0.8] =	48.53	(81)
_		-		-		•		•		•		_

Northwe	est _{0.9x}	0.77	X	5.0)4	x	2	8.07	x		0.35	x	0.8	=	27.45	(81)
Northwe	est _{0.9x}	0.77	х	4.9)6	x	2	8.07	x		0.35	x	0.8		27.01	(81)
Northwe	est _{0.9x}	0.77	X	5.0)4	x		14.2	x		0.35	x	0.8	=	13.88	(81)
Northwe	est _{0.9x}	0.77	X	4.9	96	x		14.2	x		0.35	x	0.8	=	13.66	(81)
Northwe	est _{0.9x}	0.77	X	5.0)4	x	(9.21	x		0.35	_ x [0.8		9.01	(81)
Northwe	est _{0.9x}	0.77	X	4.9	96	x	(9.21	х		0.35	_ x [0.8	=	8.87	(81)
	_															
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m																
(83)m=	54.73	100.51	156.83	226.7	283.47	29	94.42	278.45	234	1.1	180.71	116.29	66.88	45.98		(83)
Total g	ains – iı	nternal a	nd solar	(84)m =	= (73)m	+ (8	33)m	, watts								
(84)m=	439.49	482.85	525.18	572.83	607.05	59	96.22	566.48	528	.68	486.99	444.99	421.28	419.53		(84)
7 Me	an inter	nal temp	erature	(heating	season)							•			
				`			area f	from Tab	ole 9	Th	1 (°C)				21	(85)
•		tor for g	٠.			•			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	1 (0)				21	(00)
Otilise	Jan	Feb	Mar	Apr	May	r	Jun	Jul	Δ	ug	Sep	Oct	Nov	Dec		
(86)m=	1	1	0.99	0.98	0.94	\vdash	0.81	0.65	0.7	Ť	0.92	0.99	1	1		(86)
` ′						<u> </u>						0.00	'	<u> </u>		(00)
ı								ps 3 to 7		$\overline{}$					1	(a=)
(87)m=	19.73	19.85	20.07	20.39	20.69	2	0.91	20.98	20.	96	20.8	20.42	20.02	19.71		(87)
Temp	erature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Tł	n2 (°C)					
(88)m=	19.97	19.97	19.97	19.98	19.98	1	9.99	19.99	19.	99	19.99	19.98	19.98	19.98		(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)																
(89)m=	1	1	0.99	0.97	0.91	_).73	0.52	0.5	58	0.86	0.98	1	1		(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)																
(90)m=	18.28	18.45	18.77	19.23	19.66		9.92	19.98	19.	_	19.81	19.29	18.71	18.25		(90)
(50)111=	10.20	10.40	10.77	10.20	10.00	<u> </u>	0.02	10.00	10.	00			ng area ÷ (4		0.32	(91)
													3 (,	0.32	(0.)
			· `	1		_		LA × T1	<u> </u>				1		1	(22)
(92)m=	18.74	18.89	19.18	19.6	19.99		0.23	20.3	20.		20.13	19.65	19.13	18.71		(92)
				r		_		m Table		$\overline{}$			1 40 40	10.74	1	(02)
(93)m=	18.74	18.89	19.18	19.6	19.99	2	0.23	20.3	20.	29	20.13	19.65	19.13	18.71		(93)
•		ting requ					-1 -1	44 . 6	.	- 01			(70)		l-1-	
		nean int factor fo				nea	at ste	ер 11 от	rabi	e 9r	o, so tha	t 11,m=((76)m an	a re-caic	culate	
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	Dec		
Utilisa		tor for g		<u> </u>	ay		o arr	<u> </u>	, ,	<u> </u>	Oop		1			
(94)m=	1	1	0.99	0.97	0.91).75	0.56	0.6	32	0.87	0.98	0.99	1		(94)
Usefu	ıl gains,	hmGm .	W = (94	4)m x (8	4)m								1	!		
(95)m=	438.3	480.56	519.63	555.2	550.07	4	48.9	317.7	328	.67	425.07	435.2	419.13	418.64		(95)
Month	nly avera	age exte	rnal tem	perature	from T	able	e 8						1		1	
(96)m=	4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat I	loss rate	e for mea	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(9:	3)m-	– (96)m]			•	
(97)m=	1302.66	1260.08	1140.05	952.69	736.54	49	96.66	325.93	342	.36	533.09	804.36	1072.8	1299.18		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh.	/mont	th = 0.02	4 x [(97)	m – (95)m] x (4	·1)m		-	
(98)m=	643.08	523.83	461.59	286.19	138.74		0	0	0)	0	274.65	470.64	655.12		

					Tota	l por voor	(k\\/b\/\co\	r) — Sum/0	.o\ _	3453.85	(98)
		0.1			1018	ıı per year	(kWh/year	i) = Sum(9	O) _{15,912} =		= ` ` `
Space heating requirement in kWh/m²/year										43.54	(99)
9a. Energy requirements – I	ndividual h	neating s	ystems i	including	micro-C	CHP)					
Space heating: Fraction of space heat from	n secondar	v/supple	ementary	/ svstem						0	(201)
Fraction of space heat from main system(s) (202) = 1 - (201) =										1	(202)
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$										1	(204)
Efficiency of main space heating system 1										89.5	(206)
Efficiency of secondary/su	• •		a svsten	n. %						0	(208)
Jan Feb Ma	-	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	`
Space heating requiremen		<u> </u>		<u> </u>	į nug	ССР	1 001	1400	_ <u></u>] (((()))	Jui
643.08 523.83 461.		138.74	0	0	0	0	274.65	470.64	655.12		
(211) m = {[(98)m x (204)] }	x 100 ÷ (20	06)								•	(211)
718.53 585.29 515.	74 319.77	155.01	0	0	0	0	306.88	525.86	731.98		
					Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3859.05	(211)
Space heating fuel (second	• /	/month									
$= \{[(98)m \times (201)]\} \times 100 \div (215)m = 0 0 0$	(208)	0	0	0	0	0	0	0	0	1	
(210)111-					_	_	ar) =Sum(2			0	(215)
Water heating							,	7 15, 10 1			`
Output from water heater (c	alculated a	bove)								.	
154.13 135.06 141.	35 128.1	125.41	112.27	110.56	121.07	121.91	136.06	142.06	150.97		_
Efficiency of water heater			1				1	1	1	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		(217)
Fuel for water heating, kWh $(219)m = (64)m \times 100 \div (219)m$											
(219)m= 172.22 150.91 157.9		140.12	125.44	123.54	135.27	136.21	152.02	158.73	168.68]	
	•	•	•	•	Tota	I = Sum(2	19a) ₁₁₂ =	•	•	1764.21	(219)
Annual totals							k'	Wh/yeaı	r	kWh/yea	<u></u>
Space heating fuel used, ma	ain system	1								3859.05	
Water heating fuel used										1764.21	
Electricity for pumps, fans a	nd electric	keep-ho	t								
central heating pump:									30		(230c)
boiler with a fan-assisted fl	ue								45	j	(230e
Total electricity for the above, kWh/year sum of (230a)(230g) =								75	(231)		
Electricity for lighting								344.18	(232)		
	vidu <u>al hea</u> t	ting syste	ems incl	udi <u>ng mi</u>	cro-CHE)					
	CO2 emissions – Individual heating systems including micro-CHP Energy Emission factor				Emission						
Onese heating (see in a set of	- 4)			Vh/year			kg CO			kg CO2/ye	
Space heating (main systen	11)		(21	1) x			0.2	16	=	833.55	(261)

Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	381.07	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1214.62	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	178.63	(268)
Total CO2, kg/year	sum	of (265)(271) =		1432.18	(272)
Dwelling CO2 Emission Rate	(272)) ÷ (4) =		18.05	(273)
EI rating (section 14)				85	(274)

SAP 2012 Overheating Assessment

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

Property Details: Be Clean-Flat 13 - 3rd floor

Dwelling type: Flat Located in: England

Region: South East England

Cross ventilation possible: Yes
Number of storeys: 1

Front of dwelling faces: South West

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Ventilation rate during hot weather (ach): 3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient: 188.49 (P1)

Transmission heat loss coefficient: 54.2

Summer heat loss coefficient: 242.66 (P2)

Overhangs:

North West (Lounge terrace doors) 1
North West (Bedroom terrace doors) 1
South East (Bedroom) 0 1
South West (Bedroom) 0 1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North West (Lounge	e terralce doors)	0.9	1	0.9	(P8)
North West (Bedroo	m tertace doors)	0.9	1	0.9	(P8)
South East (Bedroom	m) 1	0.9	1	0.9	(P8)
South West (Bedroo	om) 1	0.9	1	0.9	(P8)

Solar gains:

Orientation	Area	Flux	g _	FF	Shading	Gains
North West (Lounge terrace of otoo	ors\$.04	105.45	0.35	0.8	0.9	120.54
North West (Bedroom ter@ace d	oor4s)96	105.45	0.35	0.8	0.9	118.63
South East (Bedroom) 0.9 x	2.3	126.97	0.35	0.8	0.9	66.23
South West (Bedroom) 0.9 x	2.3	126.97	0.35	0.8	0.9	66.23
					Total	371.63 (P3/P4)

Internal gains:

	June	July	August
Internal gains	435.36	417.68	426.38
Total summer gains	832.83	789.31	741.79 (P5)
Summer gain/loss ratio	3.43	3.25	3.06 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5
Thermal mass temperature increment	0.25	0.25	0.25
Threshold temperature	19.08	20.9	20.81 (P7)
Likelihood of high internal temperature	Not significant	Slight	Slight

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature:	<u>Slight</u>
--------------------------------------------------------	---------------