DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STR0036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: G05 BP Finchley RdAddress :G05 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m ²)Av. Height(m)Volume(m ³)Ground floor99.23(1a) x2.54(2a) =252.04(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)99.23(4)Jesting (4)Jesting (5)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =252.04(5)C. Ventilation rate:Maning Secondaryother for and rotalm ³ per hour
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2. Ventilation rate: main secondary other total m ³ per hour
main secondary other total m ^a per nour
Number of chimneys $0 + 0 + 0 = 0$ $x 40 = 0$ (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$ (6b)
Number of intermittent fans $0 \times 10 = 0$ (7a)
Number of passive vents $0 x 10 = 0 (7b)$
Number of flueless gas fires $0 \times 40 = 0 (7c)$
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)
Additional infiltration $[(9)-1]x(0.1 - 0)$ (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped 0 (14)
Window Inititration $0.23 + [0.2 \times (14) + 100] =$ 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16)
Air permeability value, $a50$, expressed in cubic metres per bour per square metre of envelope area $\frac{2}{10}$ (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$ 0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.12$ (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 /
$(22) \Pi = \begin{bmatrix} 3.1 & 5 & 4.9 & 4.4 & 4.5 & 3.6 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$
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

DER WorkSheet: New dwelling design stage

Adjusted infiltration	on rate (allow	ing for sh	elter an	d wind s	peed) =	(21a) x	(22a)m					
0.15 (0.15 0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effectiv	e air change	rate for t	he appli	cable ca	se	-					0.5	(220)
If exhaust air heat	pump using Apr	endix N. (2	3b) = (23a	i) x Fmv (e	equation (N	(5)) othe	wise (23b) = (23a)			0.5	(234)
If balanced with he	eat recovery: effi	ciency in %	allowing f	or in-use fa	actor (from	n Table 4h) =	<i>(</i> 200)			0.5	(230)
a) If balanced r	mechanical v		with he	at recove	arv (MV/F		$n_{1}^{\prime} = (2)^{\prime}$	2h)m + (23h) v [1 _ (23c)	/6.5 ÷ 1001	(230)
(24a)m = 0.27 (0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25	÷ 100]	(24a)
b) If balanced r	mechanical v	entilation	without	heat rec		() (24h)	m = (2)	$\frac{1}{2}$ () $m + ()$	23h)			
(24b)m = 0			0				0		0	0		(24b)
	se extract ve	ntilation of	or positiv		l ventilatio	n from c		<u> </u>		ů		
if (22b)m <	$0.5 \times (23b),$	then (24c	;) = (23b); otherv	vise (24	c) = (22k	m + 0	.5 × (23b))			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ver	ntilation or wh	nole hous	e positiv	/e input v	ventilatio	n from l	oft	Į	I	<u> </u>		
if (22b)m =	1, then (24d)m = (22b)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]	-			
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24d)
Effective air ch	ange rate - e	nter (24a) or (24b	o) or (240	c) or (24	d) in boy	(25)					
(25)m= 0.27 (0.26 0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losses a	ind heat loss	paramete	er:									
ELEMENT	Gross	Openin	gs	Net Ar	ea	U-valu	le Le	AXU		k-value	9	A X k
Dooro	area (m²)	m	2	A,n		vv/mz	κ 	(۷۷/	n)	KJ/M2+1	^	KJ/K
				2.1	×	1.2	=	2.52	\exists			(26)
Windows Type 1				14.758	8 x1,	/[1/(0.9)+	0.04] =	12.82				(27)
Windows Type 2				1.667	×1,	/[1/(0.9)+	0.04] =	1.45	่ _			(27)
Floor				99.228	8 ×	0.1	=	9.9228				(28)
Walls Type1	46.24	16.43	3	29.81	x	0.15	=	4.47				(29)
Walls Type2	61	2.1		58.9	x	0.14	=	8.33				(29)
Total area of elen	nents, m²			206.4	6							(31)
Party wall				22.69) X	0	=	0				(32)
Party ceiling				99.23	3				[(32b)
* for windows and roo ** include the areas o	of windows, use on both sides of i	effective wi nternal wall	ndow U-va s and part	alue calcula titions	ated using	formula 1	/[(1/U-valı	ıe)+0.04] a	as given in	paragraph	3.2	
Fabric heat loss,	W/K = S (A x	U)				(26)(30)	+ (32) =				39.52	(33)
Heat capacity Cm	$n = S(A \times k)$,					((28).	(30) + (32	2) + (32a).	(32e) =	16762.62	2 (34)
Thermal mass pa	arameter (TM	P = Cm ÷	TFA) in	n kJ/m²K			Indica	itive Value	: Medium		250	(35)
For design assessme	ents where the d	etails of the	constructi	ion are not	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
can be used instead o	of a detailed cal	culation.										
Thermal bridges :	: S (L x Y) ca	Iculated u	ising Ap	pendix ł	<						6.56	(36)
if details of thermal br	ridging are not k locc	nown (36) =	: 0.05 x (3	1)			(22)	(26) -			(a.a.=	(07)
Ventilation heat l		d monthly	,				(33) +	(30) =	(2E) m v (E		46.07	(37)
			Mov	lun	hul	Δυσ	(30)III Son	$-0.55 \times ($				
(38)m= 22.1 2	1.86 21.62	20 41	20 17	18.96	18.96	18 72	19 44	20.17	20.65	21.13		(38)
		LUT1	20.17	10.00							l	(00)
$(30)_{m}$		66.49	66.24	65.02	65.02	64 70	(39)M	f = (37) + (37) + (37)	66 72	67.21		
Stroma ESAB 2012 V	Version: 1 0 5 46	(SAD 0 02)	- http://ww			04.13	00.02	Average =	Sum(39)	/12=	66.4 8 ~	2 (39)
Stroma I OAL ZUIZ V	0.0001. 1.0.0.10	(0/1 3.92)	nup.//ww	www.suoma				- 3-	(/)			<u>ugu z ψ</u> r / '

DER WorkSheet: New dwelling design stage

Heat loss par	ameter (H	HLP), W/	/m²K					(40)m	= (39)m ÷	(4)			
(40)m= 0.69	0.68	0.68	0.67	0.67	0.66	0.66	0.65	0.66	0.67	0.67	0.68		
Number of da	lys in mo	nth (Tab	le 1a)			_			Average =	Sum(40)1	. ₁₂ /12=	0.67	(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. Water hea	ating ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occ if TFA > 13 if TFA £ 13	upancy, .9, N = 1 .9, N = 1	N + 1.76 x	[1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (1	ГFA -13.	<u>2.</u> 9)	73		(42)
Annual avera Reduce the annu not more that 12	ge hot wa Ial average 5 litres per j	ater usag hot water person per	ge in litre usage by r day (all w	es per da 5% if the a vater use, l	ay Vd,av Iwelling is hot and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us	se target o	99. f	.09		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres pe	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m= 109	105.04	101.07	97.11	93.15	89.18	89.18	93.15	97.11	101.07	105.04	109		
Enorgy contont of	of hot wator	used cal	culated m	opthly - 1	100 v Vd r	n v nm v F)Tm / 2600) kW/b/mon	Fotal = Su	m(44) ₁₁₂ =	- 1d)	1189.1	(44)
				$\frac{1}{10004}$	190 X VU,I	07.50	111 00	442.22	122.06		150 FA		
(45)m= 161.64	141.38	145.89	127.19	122.04	105.31	97.59	111.98	113.32	132.06	(45)	156.54	1559.09	(45)
lf instantaneous	water heati	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46,) to (61)	10tal = 3u	III(43)112 =		1559.09	(40)
(46)m= 24.25	21.21	21.88	19.08	18.31	15.8	14.64	16.8	17	19.81	21.62	23.48		(46)
Water storage	e loss:												
Storage volur	ne (litres,		ng any so	Diar or W	/VVHR5	storage		ame vess	sei	()		(47)
Otherwise if r	neating a to stored	hot wate	er (this ir	veiling, e icludes i	nter 110 nstantar	neous co	(47) mbi boil	ers) ente	er '0' in (47)			
a) If manufac	e ioss: :turer's di	eclared I	oss facto	or is kno	wn (kWł	n/dav).					<u> </u>		(48)
Temperature	factor fro	m Table	2h			", ddy).					, ,		(40)
Energy lost fr	om water	storage	_~ . kWh/ve	ear			(48) x (49)) =		11			(50)
b) If manufac	turer's de	eclared of	cylinder l	oss fact	or is not	known:	. , . ,						(00)
Hot water sto	rage loss	factor fr	om Tabl	e 2 (kW	h/litre/da	ıy)				0.	02		(51)
If community	neating s r from Ta	ee secti ble 2a	on 4.3							1	02	l	(52)
Temperature	factor fro	m Table	2b							0.	.6		(52)
Energy lost fr	om watei	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.0	03		(54)
Enter (50) or	(54) in (5	55)	·							1.0	03		(55)
Water storage	e loss cal	culated f	for each	month			((56)m = (55) × (41)r	n				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (57	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	t loss (ar	nual) fro	om Table	e 3						()		(58)
Primary circuit	t loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)	00.0-	l	(50)
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(99)

Combi	loss ca	alculated	for eac	ch I	month ((61)m =	(60)) ÷ 30	65 × (41))m								
(61)m=	0	0	0		0	0		0	0	0)	0	0	0	0)		(61)
Total h	neat rec	uired for	water	he	ating ca	alculated	d fo	r eac	h month	(62)	m =	0.85 × ((45)m +	+ (46)m +	(57)r	m +	(59)m + (61)m	
(62)m=	216.92	191.3	201.16	3	180.68	177.32	1	58.8	152.86	167	.26	166.81	187.34	197.65	211	.82		(62)
Solar DI	-IW input	calculated	using Ap	ope	ndix G or	Appendix	κ.Η	(negati	ve quantity	/) (ent	er '0	' if no sola	r contrib	ution to wate	er hea	ting)		
(add a	dditiona	al lines if	FGHR	Sa	and/or V	WWHRS	S ap	plies	, see Ap	penc	lix C	G)						
(63)m=	0	0	0		0	0		0	0	0)	0	0	0	0)		(63)
Output	t from v	vater hea	ter							-								
(64)m=	216.92	191.3	201.16	3	180.68	177.32	1	58.8	152.86	167	.26	166.81	187.34	197.65	211	.82		
											Outp	out from wa	ater heat	er (annual)	112		2209.93	(64)
Heat g	ains fro	om water	heatin	g, I	kWh/ma	onth 0.2	5 ′	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	د [(46)n	n + (57)m	+ (59	9)m]	
(65)m=	97.97	86.95	92.73		85.08	84.8	7	7.81	76.67	81.	46	80.47	88.13	90.73	96.3	27		(65)
inclu	de (57))m in calo	culatior	י 1 ס	f (65)m	only if c	ylin	nder i	s in the c	dwell	ing	or hot w	ater is	from com	muni	ity h	eating	
5. Int	ternal g	ains (see	e Table	5	and 5a)):												
Metab	olic gai	ns (Table	e 5). W	atts	s													
	Jan	Feb	Mar	·	Apr	May	Γ	Jun	Jul	A	ug	Sep	Oct	Nov	D	ес		
(66)m=	136.61	136.61	136.61		136.61	136.61	1	36.61	136.61	136	.61	136.61	136.61	136.61	136	.61		(66)
Lightin	g gains	(calcula	ted in <i>i</i>	٩p	pendix l	L, equat	ion	L9 o	r L9a), a	lso s	ee ⁻	Table 5		1	1			
(67)m=	23.57	20.93	17.02	Ť	12.89	9.63		8.13	8.79	11.	42	15.33	19.47	22.72	24.2	22		(67)
Applia	nces da	ains (calc	ulated	in	Append	dix L. ea	uat	tion L	13 or L1	3a). :	alsc	see Ta	ble 5	1	1			
(68)m=	255.07	257.72	251.05	5	236.85	218.93	2	02.08	190.83	188	.18	194.85	209.05	226.97	243	.82		(68)
Cookir	L gains	s (calcula	ited in	L Ap	pendix	L. equa	tior	ר L15	or L15a)), als	0.56	e Table	5	1				
(69)m=	36.66	36.66	36.66	Ţ	36.66	36.66	3	36.66	36.66	36.	66	36.66	36.66	36.66	36.	66		(69)
Pumps	and fa	I Ins dains	I (Table	 • 5:	a)		1			I					1			
(70)m=				T	0	0	Г	0	0	0)	0	0	0	0)		(70)
Losses		<u>I</u> vaporatio	n (nea	ati	ve valu	es) (Tah	L ble	5)				Į	ļ					
(71)m=	-109.29	-109.29	-109.29	3	-109.29	-109.29	-1	09.29	-109.29	-109	.29	-109.29	-109.29	-109.29	-109	.29		(71)
Water	heating	T) anien r	l Table 5				I				-					-		
(72)m=	131.68	129.39	124.64	, ₁ [118,17	113.98	1	08.07	103.05	109	48	111.77	118.46	126.01	129	9.4		(72)
Total i	ntorna	L gaine -						(66)	m + (67)m) + (68	3)m -	+ (69)m + ((70)m + ((71)m + (72)m			
(73)m=	474.3	472.03	456.69	3	431.9	406.52	3	82 27	366 65	373	07	385.93	410.96	439.69	461	43		(73)
6.50	lar gain	IS.	100.00	<u></u>	10110	100.02	l °	02.27	000.00	010	.01	000.00	110.00	100.00		. 10		(- /
Solar o	ains are	calculated	using so	lar	flux from	Table 6a	and	assoc	iated equa	tions	to co	onvert to th	e applica	able orienta	tion.			
Orienta	ation:	Access F	actor		Area			Flu	IX			g_		FF			Gains	
		Table 6d			m²			Tal	ble 6a		Т	able 6b	-	Table 6c			(VV)	
North	0.9x	0.77		x	14.	76	x	1	0.63	x		0.35	x	0.8		=	30.45	(74)
North	0.9x	0.77		x	14.	76	x	2	20.32	×		0.35	× [0.8	=	=	58.19	(74)
North	0.9x	0.77		x	14.	76	x	3	34.53	×		0.35	× [0.8	╡	=	98.88	(74)
North	0.9x	0.77		x	14.	76	x	5	55.46	×		0.35		0.8		=	158.83	(74)
North	0.9x	0.77		x	14.	76	x	7	74.72	×		0.35	× [0.8		=	213.96	(74)
								L					L				L	_

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

North	0.9x	0.77		x	14.	76	x	7	9.99	×	0.35		x	0.8		=	229.05	(74)
North	0.9x	0.77		x	14.	76	x	7	4.68	x	0.35] x [0.8		=	213.85	(74)
North	0.9x	0.77		x	14.	76	x	5	59.25	x	0.35		x	0.8		=	169.66	(74)
North	0.9x	0.77		x	14.	76	x	4	1.52	×	0.35		x	0.8		=	118.89	(74)
North	0.9x	0.77		x	14.	76	x	2	24.19	x	0.35		x	0.8		=	69.27	(74)
North	0.9x	0.77		x	14.	76	x	1	3.12	x	0.35		x	0.8		=	37.56	(74)
North	0.9x	0.77		x	14.	76	x	8	8.86	x	0.35		x	0.8		=	25.38	(74)
Northwe	est <mark>0.9</mark> x	0.77		x	1.6	7	x	1	1.28	x	0.35		x	0.8		=	3.65	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	2	22.97	x	0.35		x	0.8		=	7.43	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	4	1.38	x	0.35		x	0.8		=	13.38	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	6	67.96	x	0.35		x	0.8		=	21.98	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	9	91.35	x	0.35		x	0.8		=	29.55	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	9	97.38	x	0.35		x	0.8		=	31.5	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	9	91.1	x	0.35		x	0.8		=	29.47	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	7	2.63	x	0.35		x	0.8		=	23.49	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	5	50.42	×	0.35		x	0.8		=	16.31	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x	2	28.07	×	0.35		x	0.8		=	9.08	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x		14.2	x	0.35		x	0.8		=	4.59	(81)
Northwe	est <mark>0.9x</mark>	0.77		x	1.6	7	x		9.21	x	0.35		x	0.8		=	2.98	(81)
										_						-		
Solar g	ains in	watts, ca	alculat	ed	for eac	n mont	h		i	(83)n	n = Sum(74))m	(82)m					
(83)m=	34.1	65.62	112.2	7	180.81	243.51	2	260.55	243.31	193	.15 135.	.2	78.35	42.16	28.3	37		(83)
Total g	ains –	internal a	and so	lar	(84)m =	: (73)m) + ((83)m	, watts									
(84)m=	508.4	537.65	568.9	6	612.71	650.03	6	642.82	609.96	566	.22 521.7	13	489.31	481.85	489.	.79		(84)
7. Me	an inte	rnal temp	peratu	re (heating	seaso	n)											
Temp	erature	e during h	neating	g pe	eriods ir	the liv	ving	area	from Tab	ole 9	, Th1 (°C))					21	(85)
Utilisa	ation fa	ctor for g	ains fo	or li	ving are	ea, h1,r	n (s	see Ta	ble 9a)									_
	Jan	Feb	Ma	r	Apr	Мау	/	Jun	Jul	A	ug Se	эр	Oct	Nov	De	ес		
(86)m=	1	1	0.99		0.97	0.86		0.64	0.47	0.5	52 0.82	2	0.98	1	1			(86)
Mean	interna	al temper	ature	in li	iving are	ea T1 (foll	ow ste	ps 3 to 7	7 in T	able 9c)							
(87)m=	20.35	20.42	20.5	7	20.78	20.94		21	21	2	1 20.9	7	20.78	20.54	20.3	34		(87)
		-		_					-	-				-				

Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)				_
(88)m=	20.35	20.35	20.36	20.37	20.37	20.38	20.38	20.38	20.38	20.37	20.37	20.36	(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling, I	h2,m (se	e Table	9a)					-
(89)m=	1	1	0.99	0.96	0.83	0.58	0.4	0.46	0.76	0.97	1	1	(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=	19.46	19.58	19.79	20.1	20.31	20.38	20.38	20.38	20.35	20.11	19.75	19.46		(90)
			-						f	LA = Livin	g area ÷ (4	4) =	0.41	(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m= 19.82 19.92 20.11 20.38 20.57 20.63 20.63 20.61 20.38 20.07 19.81 (92)											-			
	(92)m=	19.82	19.92	20.11	20.38	20.57	20.63	20.63	20.63	20.61	20.38	20.07	19.81	(92)

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

(93)m=	19.82	19.92	20.11	20.38	20.57	20.63	20.63	20.63	20.61	20.38	20.07	19.81		(93)
8. Spa	ace hea	ting requ	uirement	i .										
Set Ti the ut	i to the r ilisation	mean int factor fo	ernal ter or gains	mperatur using Ta	e obtain ble 9a	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	1	1	0.99	0.96	0.84	0.61	0.43	0.48	0.78	0.97	1	1		(94)
Usefu	I gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m=	507.5	535.88	563.78	587.94	544.93	389.2	262.08	273.88	407.69	475.27	479.72	489.12		(95)
Month	nly avera	age exte	rnal tem	perature	e from Ta	able 8								(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)
Heat	loss rate	e for mea		al tempe		Lm , W =	=[(39)m	x [(93)m	- (96)m	649.00	0CE 44	1040 42		(07)
(97)m=	1058.35	1020.45	921.12	763.15	587.51	392.07	262.24	2/4.29	426.22	$\frac{648.02}{100}$	865.44	1049.43		(97)
		g require		126 15	101111, K		n = 0.02	24 X [(97])m – (95)m] X (4 128.53	1)m 277.72	116.87		
(90)11=	409.03	323.03	205.00	120.15	31.00	0	0	Toto		120.00	$\frac{211.12}{2}$	410.07	1092.27	
								Tota	i per year	(күүп/уеаг) = Sum(9	0) 15,912 =	1962.27](90)
Space	e heatin	g require	ement in	kWh/m ²	/year								19.98	(99)
9b. Ene	ergy rec	luiremer	nts – Cor	mmunity	heating	scheme)							
This pa	art is use	ed for sp	ace hea	iting, spa	ace cooli	ng or wa	ater heat	ting prov	ided by	a comm	unity sch	neme.		
Fractio	n of spa	ace neat	from se	condary/	suppien	nentary i	neating	(Table T	1) 'U' IT N	one			0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (301	1) =						1	(302)
The com	nmunity so	cheme may	/ obtain he	eat from se	everal sour	rces. The p	procedure	allows for	CHP and u	up to four (other heat	sources; tl	ne latter	
Fractio	n of hea	eat pumps at from C	s, geotherr Commun	and wa ity heat إ	aste heat f oump	rom powei	r stations.	See Appei	ndix C.				1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity he	eat pump	D			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ting sys	tem			1	(305)
Distribu	ution los	s factor	(Table 1	I2c) for c	commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	a											kWh/vear	1
Annual	space	heating	requirem	nent									1982.27]
Space	heat fro	om Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	2081.38	(307a)
Efficier	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	requirer	ment fro	m secon	dary/sup	plemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water	heating	j	oquirom	ont									2222 02	1
Annual			equirem										2209.93]
Water I	heat fro	m Comn	nunity he	ne: eat pump)				(64) x (30	03a) x (30	5) x (306) :	=	2320.43	(310a)
Electric	city used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	(310a)([310e)] =	44.02	(313)
Cooling	g Syster	m Energ	y Efficie	ncy Ratio	C								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g system	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
Electric mecha	city for p nical ve	oumps ai ntilation	nd fans v - balanc	within dv ed, extra	velling (1 act or po	Table 4f) sitive in	: put from	outside					242.15	(330a)

DER WorkSheet: New dwelling design stage

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	242.15	(331)
Energy for lighting (calculated in Appendix L)		416.24	(332)
Electricity generated by PVs (Appendix M) (negative quantity)	-565.81	(333)
Total delivered energy for all uses $(307) + (309) + (310) + (309)$	12) + (315) + (331) + (332)(237b) =	4494.39	(338)
12b. CO2 Emissions – Community heating scheme			

	Energy kWh/year	Emission factor kg CO2/kWh	[·] Emissions kg CO2/year	
CO2 from other sources of space and water he Efficiency of heat source 1 (%)	eating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 571.14	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 22.85	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372))	= 593.98	(373)
CO2 associated with space heating (secondary	/) (309) x	0	= 0	(374)
CO2 associated with water from immersion hea	ater or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water he	ating (373) + (374) + (375) =		593.98	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	= 125.67	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 216.03	(379)
Energy saving/generation technologies (333) to Item 1	o (334) as applicable	0.52 x 0.01 =	-293.65	(380)
Total CO2, kg/year sum of	(376)(382) =		642.03	(383)
Dwelling CO2 Emission Rate (383) ÷	(4) =		6.47	(384)
El rating (section 14)			94.04	(385)

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Decumo	nt 1 1 A 2012 Edition	England accored by Str	ma ESAR 2012 program Vo	reion: 1 0 5 16
Printed on 0.3 Augu	ist 2022 at 12:29:07	, England assessed by Sin	ulla FSAF 2012 ploglalli, ve	151011. 1.0.3.10
Project Informatio	n:			
Assessed By:	Robyn Berry (STR	2036659)	Building Type:	Flat
Dwelling Details:				
NEW DWELLING	DESIGN STAGE		Total Floor Area: 4	19.44m²
Site Reference :	BP Finchlev Road		Plot Reference:	G02 BP Finchlev Rd
Address :	G02 BP Finchlev R	d London NW3.5EY		
Client Details:				
Namo:				
Address :				
This report cover	s items included wi	thin the SAP calculations		
It is not a complet	te report of regulati	ons compliance.		
1a TER and DER				
Fuel for main heati	ng system: Electricity	/ (C)		
Fuel factor: 1.55 (e	lectricity (c))			
Target Carbon Dio	xide Emission Rate (TER)	28.64 kg/m²	
Dwelling Carbon D	ioxide Emission Rate	e (DER)	7.54 kg/m²	OK
1b IFEE and DFI				
Larget Fabric Ener	gy Efficiency (IFEE)		47.1 KVVh/m ²	
Dweiling Fabric En	ergy Elliciency (DFE	E)	33.7 KVVN/M2	OK
2 Fabric U-values	S			
Element		Average	Highest	
External v	vall	0.14 (max. 0.30)	0.15 (max. 0.70)	ОК
Party wall		0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof		(no roof)	· · · · · · · · · · · · · · · · · · ·	
Openings		0.95 (max. 2.00)	1.20 (max. 3.30)	ОК
2a Thermal bridg	jing			
Thermal b	oridging calculated fro	om linear thermal transmitt	ances for each junction	
3 Air permeabilit	У			
Air permeab	ility at 50 pascals		3.00 (design val	ue)
Maximum			10.0	UK
4 Heating efficier	ncy			
Main Heatin	g system:	Community heating sche	mes - Heat pump	
Secondary h	neating system:	None		
Coondary	icating system.	None		
5 Cylinder insula	tion			
Hot water St	torage:	No cylinder		
6 Controls				
Space heati	ng controls	Charging system linked to	o use of community heating, p	programmer and TRVs OK
Hot water co	ontrols:	No cylinder thermostat		
		No cylinder		

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	ОК
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	6.65m ²	
Windows facing: South East	3.04m ²	
Ventilation rate:	2.00	
Blinds/curtains:	Light-coloured curtain or roller b	lind
	Closed 100% of daylight hours	
10 Key features		
Air permeablility	3.0 m ³ /m ² h	
Windows U-value	0.9 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.1 W/m²K	
Community heating, heat from electric heat pump		

Photovoltaic array

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documer	nt L1A, 2013 Edition	England assessed by Stroma	FSAP 2012 program Ver	sion: 1.0.5 16
Printed on 03 Augu	ist 2022 at 12:29:06	, England assessed by Ottoma		301. 1.0.0.10
Project Information	n:			
Assessed By:	Robyn Berry (STR	D036659)	Building Type:	Flat
Dwelling Details:				
NEW DWELLING	DESIGN STAGE		Total Floor Area: 9	9.23m²
Site Reference :	BP Finchley Road		Plot Reference:	G05 BP Finchley Rd
Address :	G05 BP Finchley R	d, London, NW3 5EY		
Client Details:				
Name:				
Address :				
This report covers It is not a complet	s items included wi e report of regulation	thin the SAP calculations. ons compliance.		
1a TER and DER				
Fuel for main heatir	ng system: Electricity	/ (C)		
Fuel factor: 1.55 (el	lectricity (c))			
Target Carbon Diox	kide Emission Rate (TER)	26.52 kg/m ²	01/
1b TEEE and DEE	E E E E E E E E E E E E E E E E E E E	e (DER)	6.47 Kg/m²	OK
Target Fabric Energy	 av Efficiency (TFEE)		56.8 kWh/m ²	
Dwelling Fabric Energy	ergy Efficiency (DFE	E)	40.0 kWh/m ²	
U U		,		ОК
2 Fabric U-values	5			
Element		Average	Highest	
External w	vall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall		0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Openings		(101001) 0.93 (max. 2.00)	1 20 (max 3 30)	OK
2a Thermal bridg	ina	0.00 (max. 2.00)	1.20 (114). 0.00)	
Thermal b	ridging calculated fro	om linear thermal transmittance	es for each junction	
3 Air permeability	y			
Air permeab	ility at 50 pascals		3.00 (design valu	le)
Maximum			10.0	OK
4 Heating efficier	ncy			
Main Heating	g system:	Community heating schemes	- Heat pump	
Secondary h	eating system:	None		
5 Cylinder insula	tion			
Hot water St	orage:	No cylinder		
6 Controls				
00111013				
Space heatir	ng controls	Charging system linked to us	e of community heating, p	rogrammer and TRVs OK
Hot water co	ontrols:	No cylinder thermostat No cylinder		-

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	ОК
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North	14.76m ²	
Windows facing: North West	1.67m ²	
Ventilation rate:	2.00	
Blinds/curtains:	None	
10 Key features		
Thermal bridging	0.032 W/m²K	
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.1 W/m²K	
Community heating, heat from electric heat pump		

Photovoltaic array

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STRO036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: G02 BP Finchley RdAddress :G02 BP Finchley Rd, London, NW3 5EYImage: Colspan="2">Output: Mage: Colspan="2">Output: Colspan="2">Output: Colspan="2">Output: Colspan="2">Stroma Number:Software Version:Version: 1.0.5.16Property Address: G02 BP Finchley RdOutput: Colspan="2">Output: Colspan="2">Output: Colspan="2">Output: Colspan="2">Output: Colspan="2">Output: Colspan="2">Software Version:Version:1.0 versall dwelling dimensions:Area(m ²)Av. Height(m)Volume(m ²)Gound floorArea(m ²)Av. Height(m)Volume(m ²)Output: Colspan="2">Colspan="2"Area(m ²)Av. Height(m)Volume(m ²)Colspan="2">Area(m ²)Av. Height(m)Volume(m ²)Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Mather of Colspan="2"Mather of Colspan="2"Number of colspan="2"Num
Software Version:Version: 1.0.5.16Property Address: G02 BP Finchley RdAddress :G02 BP Finchley Rd, London, NW3 5EYAcverall dwelling dimensions:Area(m ²)Av. Height(m)Volume(m ³)Ground floor40.44(1a) × 2.54 (2a) =Volume(m ³)Ground floor49.44(1a) × 2.54 (2a) =(2a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)49.44(4)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =(125.59(5)Number of chirmeysoAde =o(6a)Number of chirmeyso+o+oColspan="4">(a)Number of chirmeyso+o+oNumber of passive ventso+o+oNumber of flueless gas fireso+o+o+o+oNumber of storeys in the data
Property Address: G02 BP Finchley RdAddress: G02 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m²)Ground floorArea(m²)Av. Height(m)Volume(m²)Ground floorArea(m²)Av. Height(m)Volume(m²)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)49.44(49.44(49.44(40.44)Owned (a)(2a)(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)49.44(40.44)(2a)(3a)Output: (a)(a)(40.44)(a)(a)Mumber of area TFA = (1a)+(1b)+(1c)+(1e)+(1e)+(1n)(49.44)(a)(a)Output: (a)(a)(a)(a)Mumber of area TFA = (1a)+(1b)+(1c)+(1e)+(1n)(a)(a)(a)Mumber of colspan="2">(a)(a)(a)Number of colspan="2">(a)(a)(a)Number of colspan="2">(a)(a)(a)(a)(a)(a)(a) <th< td=""></th<>
Address :G02 BP Finchley Rd, London, NW3 5EYI.Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 49.44 (1a) x 2.54 (2a) = 125.59 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.44 (1a) x 2.54 (2a) = 125.59 (3a)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n)$ = 125.59 (5)C.Ventilation rate:main heating +ooo(a)Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a)Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b)Number of passive vents 0 x 10 = 0 (7a)Number of flueless gas fires 0 x 40 = 0 (7c)Number of storeys in the dwelling (ns) $40.4(17b)+(7c) =$ 0 (4)Additional infiltration(B)-1(b)-1(a) + 0 (10)Structural infiltration:0.25 for steel or timber frame or 0.35 for masonry construction 0 (10)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. 0 (12)if no draught lobby, enter 0.05, else enter 0 0 (12) 0 (13)Percentage of windows and doors draught stripped 0 (14)
Area(m ²) Av. Height(m) Volume(m ³) Ground floor 49.44 (1a) x 2.54 (2a) = 125.59 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.44 (4) (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n)$ = 125.59 (5) 2. Ventilation rate: main secondary other total m ³ per hour Number of chimneys 0 $+$ 0 $=$ 0 $x40$ = 0 $(6a)$ Number of paes flues 0 $+$ 0 $=$ 0 $x10$ = 0 $(7a)$ Number of passive vents 0 $x10$ = 0 $(7c)$ Number of flueless gas fires 0 $x10$ = 0 $(7c)$ Number of storeys in the dwelling (ns) $Additional infiltration (9)+(7b)+(7c) = + 0 (10) 0 (11) If our substance of wall are present, use the value corresponding to the greater wall area (after deddefing); if equal use 0.35 0 (12) 0 (12) If no draught lobby, enter 0.5, else enter 0 0 0 0 (12) $
Area(m*)Av. Height(m)Volume(m*)Ground floor $49,44$ $(1a) \times 2.54$ $(2a) = 125.59$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 49.44 (4) (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.59$ (5) 2. Ventilation rate: totalm³ per hourNumber of chimneys 0 $+$ 0 $=$ 0 Number of open flues 0 $+$ 0 $=$ 0 $(6a)$ Number of passive vents 0 $+$ 0 $=$ 0 $(7a)$ Number of flueless gas fires 0 $\times 10 =$ 0 $(7c)$ Number of storeys in the dwelling (ns) $Additional infiltration(9) \times (16)(9) \times (16)Number of storeys in the dwelling (ns)Additional infiltration(9) \times (10) \times (10)0(11)If both types of wall are present, use the value corresponding to the greater wall area (after adectaread worden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00(12)If no draught lobby, enter 0.05, else enter 00(12)0(13)Percentage of windows and doors draught stripped0(14)$
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.44 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.59$ (5) 2. Ventilation rate: Number of chimneys 0 + 0 + 0 = 0 $x 40 = 0$ (6a) Number of open flues 0 + 0 + 0 = 0 $x 20 = 0$ (6b) Number of intermittent fans 0 $x 10 = 0$ (7a) Number of passive vents 0 $x 10 = 0$ (7b) Number of flueless gas fires 0 $x 40 = 0$ (7c) Air changes per hour Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) = 0$ $\div (5) = 0$ (8) <i>If a pressurisation test has been carried out or is intended, proceed to</i> (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration (9) $x 40 = 0$ (9) Additional infiltration (9) $x 40 = 0$ (10) Structural infiltration (9) $x 50$ (10) Structural infiltration (9) $x 50$ (10) If suppended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped
Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.59 (5)2. Ventilation rate:Number of chimneys \bigcirc \bigcirc \circ <
2. Ventilation rate: main heating secondary heating other total m³ per hour Number of chimneys 0 + 0 = 0 x40 = 0 (6a) Number of open flues 0 + 0 = 0 x40 = 0 (6b) Number of intermittent fans 0 + 0 = 0 x10 = 0 (7a) Number of passive vents 0 x10 = 0 (7b) (7c) (7c) (7c) Number of flueless gas fires 0 x40 = 0 (7c) (7c) (7c) Number of storeys in the dwelling (ns) 0 x40 = 0 (7c) (7c) Additional infiltration (9) (9) (10) (9) (10) (9) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (9) (11) (11) 0 (12) 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 0 (12) (13) Percentage of windows and do
Indim heating heatingSecondary heatingOnterIotalIne periodNumber of chimneys $0 + 0 + 0 + 0 = 0$ $x40 = 0$ $6a$ Number of open flues $0 + 0 + 0 = 0$ $x20 = 0$ $6b$ Number of intermittent fans $0 + 0 = 0$ $x10 = 0$ $7a$ Number of passive vents $0 + 0 = 0$ $x10 = 0$ $7a$ Number of flueless gas fires $0 + 10 = 0$ $7b$ Number of flueless gas fires $0 + 10 = 0$ $7c$ Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $+(5) = 0$ $6b$ If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) (9) Number of storeys in the dwelling (ns) $(9)-1]x0.1 = 0$ (9) Additional infiltration $(9)-1]x0.1 = 0$ (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Number of chimneys0+0+0=0 $x 40 =$ 0(6a)Number of open flues0+0+0=0 $x 20 =$ 0(6b)Number of intermittent fans0 $x 10 =$ 0(7a)Number of passive vents0 $x 10 =$ 0(7b)Number of flueless gas fires0 $x 40 =$ 0(7c)Number of flueless gas fires0 $x 40 =$ 0(7c)Air changes per hourInfiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) =0 \div (5) =0(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)(9)(9)Number of storeys in the dwelling (ns)(9)(10)(10)Additional infiltration(9)-1]x0.1 =0(11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35(11)0If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00(12)If no draught lobby, enter 0.05, else enter 00(13)Percentage of windows and doors draught stripped0(14)
Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $\times 20 =$ 0 $(6b)$ Number of intermittent fans 0 $\times 10 =$ 0 $(7a)$ Number of passive vents 0 $\times 10 =$ 0 $(7a)$ Number of flueless gas fires 0 $\times 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $\times 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $+$ $(6) =$ 0 If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) (9) (9) Number of storeys in the dwelling (ns) 0 (9) (10) Additional infiltration (9) (10) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If no draught lobby, enter 0.05 , else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Number of intermittent fans 0 $x 10 =$ 0 $(7a)$ Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8) If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) 0 (9) Number of storeys in the dwelling (ns) 0 (9) (9) Additional infiltration (9) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) <i>i</i> 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 0 (12) If no draught lobby, enter 0.05 , else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8) If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) (9) (9) Number of storeys in the dwelling (ns) 0 (9) (10) Additional infiltration $(9)-1]x0.1 =$ 0 (11) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 (8) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) $\div (5) =$ 0 (9) Number of storeys in the dwelling (ns) 0 (9) (10) (10) Additional infiltration $[(9)-1]x0.1 =$ 0 (11) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If no draught lobby, enter 0.05 , else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (5) =0(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) \div (5) =0(9)Number of storeys in the dwelling (ns)0(9)(10)Additional infiltration[(9)-1]x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0(11) <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</i> 0(12)If no draught lobby, enter 0.05, else enter 00(13)0(14)Percentage of windows and doors draught stripped0(14)
Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)0(9)Number of storeys in the dwelling (ns)0(9)Additional infiltration[(9)-1]x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0(11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(12)If no draught lobby, enter 0.05, else enter 00(13)0(13)Percentage of windows and doors draught stripped0(14)
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 \div (5) =0(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) \div (5) =0(8)Number of storeys in the dwelling (ns)0(10)0(10)Additional infiltration[(9)-1]x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0(11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(12)If no draught lobby, enter 0.05, else enter 00(13)0(13)Percentage of windows and doors draught stripped0(14)
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) 0 Additional infiltration [(9)-1]x0.1 = Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 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 0 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Number of storeys in the dwelling (ns) 0 (9) Additional infiltration [(9)-1]x0.1 = 0 (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Additional initiation ((9)-1)x0.1 = 0 (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 0 (12) If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
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If no draught lobby, enter 0.05, else enter 0 0 (13) Percentage of windows and doors draught stripped 0 (14)
Percentage of windows and doors draught stripped
$0.25 [0.2 \ y \ (14) \ (100] =$
Window Inilitration $0.25 + [0.2 \times (14) \div 100] =$ 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16)
Air permeability value, $a50$, expressed in cubic metres per bour per square metre of envelope area $\frac{2}{10}$
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.12$ (21)
Infiltration rate modified for monthly wind speed
_ Jan ⊢eb 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

DER WorkSheet: New dwelling design stage

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Adjusted in	filtration ra	ate (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.1	5 0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate e	effective ail nical ventil	r change	rate for t	he appli	cable ca	se						0.5	(232)
If exhaust a	air heat pump	o using App	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23b)
If balanced	with heat red	covery: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =	, , ,			76.5	(23c)
a) If bala	nced mech	nanical ve	entilation	with he	at recove	erv (MVI	HR) (24a	a)m = (2	2b)m + ((23b) × [1 – (23c)	÷ 100]	(100)
(24a)m= 0.2	.7 0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(24a)
b) If bala	nced mech	nanical ve	entilation	without	heat rec	covery (N	u MV) (24b)m = (22	1 2b)m + (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If who	e house e	xtract ver	ntilation o	or positiv	ve input v	ventilatio	on from o	outside		•			
if (22	b)m < 0.5	× (23b), t	then (24	c) = (23b); other	wise (24	c) = (22t	o) m + 0	.5 × (23	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natu	ral ventilat	ion or wh	ole hous	e positiv	/e input	ventilatio	on from I	loft	0 51				
(24d)m-0	$\frac{1}{1}$		$\frac{1}{1} = \frac{221}{2}$			$\frac{4}{1}$	0.5 + [(2	20)m² x		0	0	1	(24d)
Effective			$\int_{-\infty}^{0}$	$\int \frac{1}{24k}$	\sim	$r = \frac{1}{24}$		(25)	0	0	0		(210)
(25)m = 0.2			0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(25)
	0.20	0.20	0.20	0.21	0.20	0.20	0.20	0.20	0.21	0.20	0.20]	()
3. Heat lo	sses and h	neat loss i	paramete	er:									
ELEMEN	T Gro area	oss a (m²)	Openin m	gs I ²	Net Ar A ,r	rea m²	U-val W/m2	ue 2K	A X U (W/	K)	k-value kJ/m²∙I	e K	A X k kJ/K
Doors					2.1	x	1.2	=	2.52				(26)
Windows Type 1 6.649 $x1/[1/(0.9)+0.04] = 5.78$													(27)
Windows Type 2 $3.035 \times 1/[1/(0.9) + 0.04] = 2.64$												(27)	
Floor					49.44	4 x	0.1	=	4.9444	1 I			(28)
Walls Type	1 27	.26	9.68	;	17.58	3 X	0.15	=	2.64			7	(29)
Walls Type	2 20	.81	2.1		18.71	ı x	0.14	=	2.65			7	(29)
Total area	of element	s, m²			97.51	1							(31)
Party wall					29.03	3 X	0	=	0				(32)
Party ceilin	g				49.44	1				i		$\exists \vdash$	(32b)
* for windows ** include the	and roof win	dows, use e h sides of ir	effective wi	ndow U-va Is and pan	alue calcul	ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
Fabric heat	loss, W/K	. = S (A x	U)	io ana pan			(26)(30)) + (32) =				21.16	(33)
Heat capac	ty Cm = S	S(Axk)	,					((28).	(30) + (3	2) + (32a).	(32e) =	8675	(34)
Thermal ma	ass param	eter (TMI	⊃ = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design as	sessments w nstead of a d	here the de	etails of the	construct	ion are noi	t known pi	recisely the	e indicative	e values o	f TMP in T	able 1f		
Thermal br	idges : S (I	L x Y) cal	culated u	using Ap	pendix I	K						4.22	(36)
if details of the	ermal bridging	g are not kr	nown (36) =	= 0.05 x (3	1)								
Total fabric heat loss (33) + (36) =											25.38	(37)	
Ventilation	heat loss o	calculated	d monthly	/				(38)m	= 0.33 ×	(25)m x (5)		
Ja	in Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 11.	01 10.89	10.77	10.17	10.05	9.45	9.45	9.33	9.69	10.05	10.29	10.53		(38)
Heat transf	er coefficie	ent, W/K			-			(39)m	= (37) + ((38)m			
(39)m= 36.	39 36.27	36.15	35.55	35.43	34.82	34.82	34.7	35.06	35.43	35.67	35.91		
	004014 ·	4 9 5 49		1					Average -	Sum(30)		35.58	a (30)

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Average = Sum(39)_{1...12} /12= $35.5p_{age 2} \phi^{(39)}$

DER WorkSheet: New dwelling design stage

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	0.74	0.73	0.73	0.72	0.72	0.7	0.7	0.7	0.71	0.72	0.72	0.73		
Numbe	r of dav	s in mo	nth (Tab	le 1a)					ļ	Average =	Sum(40)1.	12 /12=	0.72	(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	I		<u> </u>	ļ	ļ	<u> </u>	<u> </u>						1	
4. Wa	ter heat	ing enei	rgy requ	irement:								kWh/ye	ear:	
Assum if TF/ if TF/	ed occu A > 13.9 A £ 13.9	pancy, l 9, N = 1 9, N = 1	N + 1.76 x	:[1 - exp	(-0.0003	849 x (TF	-13.9)2)] + 0.0)013 x (1	ΓFA -13.	1. 9)	67]	(42)
Annual Reduce a not more	averag the annua that 125	e hot wa I average litres per j	ater usag hot water person pel	ge in litre usage by r day (all w	es per da 5% if the d vater use, l	ay Vd,av Iwelling is hot and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us	se target o	73 f	.95		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					1	
(44)m=	81.35	78.39	75.43	72.47	69.51	66.56	66.56	69.51	72.47	75.43	78.39	81.35		
_							_		1	Fotal = Su	m(44) ₁₁₂ =		887.42	(44)
Energy c	ontent of	hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	n x nm x C	0Tm / 3600) kWh/mon	th (see Ta	ables 1b, 1	c, 1d)	1	
(45)m=	120.63	105.51	108.87	94.92	91.08	78.59	72.83	83.57	84.57	98.56	107.58	116.83		
I otal = $Sum(45)_{112}$ = If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)											1163.54	(45)		
(46)m=	18.1	15.83	16.33	14.24	13.66	11.79	10.92	12.54	12.69	14.78	16.14	17.52		(46)
Water storage loss:														
Storage	e volum	e (litres)	includir	ng any se	olar or W	/WHRS	storage	within sa	ame vess	sel	(0		(47)
If comn	nunity h	eating a	ind no ta	nk in dw	/elling, e	nter 110	litres in	(47)			47)			
Water s	storage	loss:	not wate	er (this ir	iciudes i	nstantar	ieous co	nod idm	ers) ente	er u in (47)			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				(0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	storage	, kWh/ye	ear			(48) x (49)	=		1	10		(50)
b) lf m	anufact	urer's de	eclared of	cylinder	loss fact	or is not	known:						1	
Hot wa	ter stora	age loss	factor fr	om Tab	le 2 (kW	h/litre/da	ıy)				0.	02		(51)
Volume	e factor	from Ta	ble 2a	011 4.5							1	03	1	(52)
Tempe	rature fa	actor fro	m Table	2b							0	.6		(52)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =	1.	03		(54)
Enter ((50) or (54) in (5	55)								1.	03		(55)
Water s	storage	loss cal	culated	for each	month			((56)m = (55) × (41)r	n				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	r contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary	/ circuit	loss (ar	nual) fro	om Table	e 3						(0]	(58)
Primary	/ circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mod	lified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	lculated	for ea	ch	month (61)m =	(60)) ÷ 30	65 × (41))m								
(61)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(61)
- Total h	eat req	uired for	water	he	ating ca	alculated	l fo	r eac	h month	(62)	m =	0.85 × ((45)m -	+ (46)m +	(57))m +	(59)m + (61)m	
(62)m=	175.91	155.44	164.1	5	148.41	146.35	1:	32.09	128.1	138	.85	138.06	153.83	3 161.08	17	2.1		(62)
Solar DH	IW input	calculated	using A	ppe	endix G or	Appendix	(H)	(negati	ve quantity	/) (ent	er '0'	' if no sola	r contrib	ution to wat	er hea	ating)		
(add ac	ditiona	al lines if	FGHR	Sa	and/or V	VWHRS	ap	plies	, see Ap	penc	lix C	G)	-		-			
(63)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(63)
Output	from w	ater hea	ter															
(64)m=	175.91	155.44	164.1	5	148.41	146.35	1:	32.09	128.1	138	.85	138.06	153.83	3 161.08	17	2.1		_
_											Outp	out from wa	ater hea	ter (annual)	112		1814.38	(64)
Heat ga	ains fro	m water	heatin	g,	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 >	(46)r	n + (57)m	n + (5	59)m]	
(65)m=	84.33	75.02	80.42	2	74.36	74.5	6	8.93	68.44	72.	01	70.91	76.99	78.57	83	.07		(65)
inclu	de (57)	m in calo	culation	n o	f (65)m	only if c	ylir	nder i	s in the c	dwell	ing	or hot w	ater is	from com	nmur	nity h	eating	
5. Inte	ernal g	ains (see	a Table	e 5	and 5a)):												
Metabo	olic gair	ns (Table	e 5). W	att	s													
[Jan	Feb	Ma	r	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov		Dec		
(66)m=	83.69	83.69	83.69	,	83.69	83.69	8	3.69	83.69	83.	69	83.69	83.69	83.69	83	.69		(66)
Lighting	g gains	(calcula	ted in <i>i</i>	Ap	pendix l	L, equat	ion	L9 o	r L9a), a	lso s	ee ⁻	Table 5	1	-				
(67)m=	13.12	11.65	9.48	T	7.17	5.36	4	4.53	4.89	6.3	86	8.54	10.84	12.65	13	.48		(67)
Applian	ices ga	ins (calc	ulated	in	Append	dix L, eq	uat	tion L	13 or L1	3a), :	also	see Ta	ble 5		1		I	
(68)m=	145.79	147.3	143.4	9	135.37	125.13	1	15.5	109.07	107	.56	111.37	119.48	3 129.73	139	9.36		(68)
Cookin	g gains	(calcula	ted in	Ap	pendix	L, equat	tior	n L15	or L15a)), als	0 SE	e Table	5	I	1			
(69)m=	31.37	31.37	31.37	Ţ	31.37	31.37	3	1.37	31.37	31.	37	31.37	31.37	31.37	31	.37		(69)
Pumps	and fa	ns dains	(Table	e 5	a)										1		I	
(70)m=	0	0	0	T	0	0	Γ	0	0	0)	0	0	0		0		(70)
Losses	e.a. ev	/aporatio	n (nec	ati	ve valu	es) (Tab	le	5)					I		1			
(71)m=	-66.95	-66.95	-66.9	5	-66.95	-66.95	-6	, 66.95	-66.95	-66	.95	-66.95	-66.95	66.95	-66	6.95		(71)
L Water h	neating	u aains (T	able 5	 ;)			Į								1			
(72)m=	113.35	111.64	108.0	9	103.27	100.14	g	5.73	91.98	96.	79	98.49	103.48	3 109.12	11	1.65		(72)
L Total in	nterna	aains =	I					(66))m + (67)m	ı 1 + (68	3)m +	- (69)m + ((70)m +	(71)m + (72	!)m			
(73)m=	320.37	318.7	309.1	7	293.93	278.74	2	63.87	254.05	258	.81	266.5	281.91	299.6	31	2.6		(73)
6. Sola	ar gain	s:												I				
Solar ga	ains are	calculated	using so	olar	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e applic	able orienta	tion.			
Orienta	ition:	Access F	actor		Area			Flu	IX			g_		FF			Gains	
	-	Table 6d			m²			Ta	ble 6a		Т	able 6b		Table 6c			(W)	
Southea	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	3	36.79	x		0.35	x	0.8		=	21.67	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	6	62.67	×		0.35	×	0.8		=	36.91	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	8	35.75	x		0.35	x	0.8		=	50.5	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	06.25	×		0.35	x	0.8		=	62.57	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	19.01	×		0.35	×	0.8		=	70.09	(77)

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	18.15	x	0.	35	_ × [0.8		= [69.58	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	13.91	x	0.	35) × [0.8		= [67.08	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	04.39	x	0.	35) × [0.8		= [61.48	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	g	92.85	x	0.	35	_ × [0.8		= [54.68	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	6	9.27	×	0.	35] × [0.8		= [40.79	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	4	4.07	x	0.	35] × [0.8		= [25.95	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	3	31.49	x	0.	35] × [0.8		= [18.54	(77)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	3	86.79]	0.	35] × [0.8		= [47.47	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	6	62.67]	0.	35	_ × [0.8		= [80.86	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	8	35.75]	0.	35	_ × [0.8		= [110.64	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	06.25]	0.	35	_ × [0.8		= [137.08	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	19.01]	0.	35	×	0.8		= [153.54	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	18.15]	0.	35) × [0.8		= [152.43	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	13.91]	0.	35	×	0.8		= [146.96	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	04.39]	0.	35	×	0.8		= [134.68	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	g	2.85]	0.	35	_ × [0.8		= [119.79	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	6	9.27]	0.	35	×	0.8		= [89.37	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	4	4.07]	0.	35	_ × [0.8		= [56.86	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	3	31.49]	0.	35) × [0.8	:	= [40.62	(79)
Solar o	gains in	watts, ca	alcula	ated	for eacl	n month	<u> </u>		i	(83)m	n = Sum((74)m	.(82)m					
(83)m=	69.14	117.77	161.	14	199.66	223.63	2	22.01	214.04	196	.16 17	74.48	130.16	82.81	59.17	7		(83)
Total g	gains – i	nternal a	and so	olar	(84)m =	= (73)m	+ (83)m	, watts	r				-i				(2.1)
(84)m=	389.5	436.47	470	.3	493.58	502.37	4	85.88	468.1	454	.96 44	40.98	412.07	382.42	371.7	'6		(84)
7. Me	ean inter	rnal temp	beratu	ure (heating	seasor	า)											_
Temp	perature	during h	eatin	g pe	eriods ir	n the livi	ng	area	from Tab	ole 9	, Th1 ('	°C)					21	(85)
Utilisa	ation fac	ctor for g	ains f	for li	ving are	ea, h1,n	<u>ו (s</u>	ee Ta	ble 9a)			r						
	Jan	Feb	Ma	ar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	De	с		
(86)m=	0.99	0.97	0.9	2	0.81	0.65		0.46	0.33	0.3	35 (0.55	0.83	0.96	0.99)		(86)
Mean	interna	al temper	ature	in li	ving are	ea T1 (f	ollc	ow ste	ps 3 to 7	7 in T	able 9	c)		-	_			
(87)m=	20.54	20.67	20.8	31	20.94	20.99		21	21	2	1	21	20.94	20.74	20.52	2		(87)
Temp	perature	during h	eatin	ig pe	eriods ir	n rest of	dw	velling	from Ta	able 9	9, Th2	(°C)						
(88)m=	20.31	20.31	20.3	31	20.32	20.33	2	20.34	20.34	20.	34 2	0.33	20.33	20.32	20.32	2		(88)
Utilisa	ation fac	ctor for a	ains f	for re	est of d	wellina.	h2	.m (se	e Table	9a)	-			8				
(89)m=	0.98	0.96	0.9)	0.78	0.6	Γ	0.41	0.28	0.:	3 ().49	0.79	0.95	0.99	,		(89)
Mean	interna	I temper	ature	in t	he rest	of dwell	lina	1 T2 (f	ollow ste	ens 3	to 7 in	n Table	9c)	4	•			
(90)m=	19.71	19.89	20.0	09	20.26	20.32		20.34	20.34	20.	34 2	0.33	20.27	20	19.68	в		(90)
	L	!		1					ļ			fL	A = Livi	ng area ÷ (4	4) =		0.62	(91)
																L		_

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m= 20.22 20.37 20.54 20.68 20.73 20.75 20.75 20.75 20.74 20.69 20.46 20.2

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

										_	-			
(93)m=	20.22	20.37	20.54	20.68	20.73	20.75	20.75	20.75	20.74	20.69	20.46	20.2		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the r	nean int	ernal ter	mperatui	re obtair	ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u	linsation	Tactor to	or gains		Ible 9a	lun		Aug	Son	Oct	Nov	Dec		
Utilis	ation fac	tor for a	ains hm	<u>.</u> Ч.	iviay	Jun	Jui	Aug	Sep		NUV	Dec		
(94)m=	0.98	0.96	0.91	0.8	0.63	0.44	0.31	0.33	0.53	0.81	0.95	0.99		(94)
Usefu	ul gains,	hmGm	, W = (94	4)m x (84	4)m	1			I		1			
(95)m=	382.18	418.84	428.3	393.9	315.94	213.84	144.44	150.9	232.08	333.94	364.87	366.32		(95)
Mont	hly aver	age exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]	1			()
(97)m=	579.46	561.14	507.5	418.82	320.05	214.08	144.45	150.92	232.98	357.34	476.37	574.42		(97)
Spac	e heatin	g require	ement fo	or each n		/Vh/mon ⁻	th = 0.02	24 x [(97])m – (95 I)m] x (4	1)m	454.00		
(98)m=	146.77	95.62	58.92	17.95	3.06	0	0	0	0	17.4	80.28	154.83	574.00	
								lota	l per year	(kWh/yeai	r) = Sum(9	8)15,912 =	574.83	(98)
Spac	e heatin	g require	ement in	kWh/m ²	/year								11.63	(99)
9b. En	ergy rec	luiremer	nts – Cor	mmunity	heating	scheme	;							
This pa	art is us	ed for sp	ace hea	ting, spa	ace cool	ing or wa	ater heat	ting prov	ided by	a comm	unity scł	neme.	-	
Fractio	on of spa	ice neat	from se	condary/	suppier	nentary	neating	(Table 1	1) 'U' if n	one			0	(301)
Fractio	on of spa	ice heat	from co	mmunity	system	1 – (30′	1) =						1	(302)
The con	nmunity so	heme mag	y obtain he	eat from se	everal sou	rces. The _F	procedure	allows for	CHP and	up to four	other heat	sources; tl	he latter	
Fractic	on of hea	eat pumps at from C	s, geotneri Commun	itv heat i	aste neat i Dump	rom powe	r stations.	See Appel	naix C.			I	1	(303a)
Fractio	on of tota	al space	heat fro	m Comn	nunity he	eat pum	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	l 2c) for c	ommun	ity heati	ng syste	m	0,				1.05	(306)
Space	heating	u c										I	kWh/vea] r
Annua	l space	heating	requiren	nent									574.83	
Space	heat fro	m Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	603.57	(307a)
Efficie	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =	[0	(309)
Water	heating	I												_
Annua	l water h	neating r	equirem	ent									1814.38	
If DHV Water	V from contract from heat from the structure of the second	ommunii m Comn	ty schem nunity he	ne: eat pump	D				(64) x (30	03a) x (30	5) x (306) :	-	1905.1	(310a)
Electri	city used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	25.09	(313)
Cooling System Energy Efficiency Ratio											0	(314)		
Space cooling (if there is a fixed cooling system, if not enter 0) $= (107) \div (314) =$											ĺ	0	(315)	
Electri	city for p inical ve	umps ai	nd fans v - balanc	within dv	velling (⁻	Fable 4f) sitive in	: put from	outside					120.66	- (330a)

DER WorkSheet: New dwelling design stage

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	120.66	(331)
Energy for lighting (calculated in Appendix L)		231.69	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-285.95	(333)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (332)(237b) =	2575.08	(338)
12b. CO2 Emissions – Community heating scheme			

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water h Efficiency of heat source 1 (%)	eating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 325.5	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 13.02	(372)
Total CO2 associated with community system	S (363)(366) + (368)(372))	= 338.52	(373)
CO2 associated with space heating (secondar	y) (309) x	0	= 0	(374)
CO2 associated with water from immersion he	eater or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water he	eating (373) + (374) + (375) =		338.52	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	= 62.62	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 120.25	(379)
Energy saving/generation technologies (333) t Item 1	to (334) as applicable	0.52 × 0.01 =	-148.41	(380)
Total CO2, kg/year sum of	f (376)(382) =		372.98	(383)
Dwelling CO2 Emission Rate (383) -	÷ (4) =		7.54	(384)
El rating (section 14)			94.71	(385)

DER WorkSheet: New dwelling design stage

User Details:	
Assessor Name: Robyn Berry Stroma Number: STRO	036659
Software Name:Stroma FSAP 2012Software Version:Version	n: 1.0.5.16
Property Address: 405 BP Finchley Rd	
Address : 405 BP Finchley Rd, London, NW3 5EY	
1. Overall dwelling dimensions:	
Area(m²)Av. Height(m)Ground floor 72.1 $(1a) \times 2.54$ $(2a) = 1$	Volume(m³) 183.14 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 72.1 (4)	
Dwelling volume $(3a)+(3c)+(3c)+(3d)+(3e)+(3n) =$	183.14 (5)
2. Ventilation rate:	
heating heating total	m ³ per nour
Number of chimneys $0 + 0 + 0 = 0 \times 40 =$	0 (6a)
Number of open flues 0 + 0 = 0 × 20 =	0 (6b)
Number of intermittent fans 0 x 10 =	0 (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 = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ \div (5) =	0 (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)	0 (9)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0 (11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0 (12)
If no draught lobby, enter 0.05, else enter 0	0 (13)
Percentage of windows and doors draught stripped	0 (14)
$0.25 = [0.2 \times (14) + 100] =$	0 (15)
Air permeability value, g50, expressed in cubic metres per hour per square metre of envelope area	3 (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	
Number of sides sheltered	3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] =$	0.78 (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	0.12 (21)
Inflitration rate modified for monthly wind speed	
Jan Feb Ivia Api Iviay Jun Jun Aug Sep Oci NOV Dec	
Monthly overage wind encod from Table 7	
Monthly average wind speed from Table 7 (22)m= 51 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	
Monthly average wind speed from Table 7(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	

DER WorkSheet: New dwelling design stage

Adjuste	ed infiltra	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m					
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calcula If me	ate ettec chanica	ctive air	<i>change i</i> ition:	rate for ti	he appli	cable ca	se						0.5	(23a)
lf exh	aust air he	eat pump	using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (√5)) , othe	rwise (23b	o) = (23a)			0.5	(23b)
lf bala	anced with	heat reco	overy: effici	ency in %	allowing f	or in-use fa	actor (fron	n Table 4h) =	, , ,			76.5	(23c)
a) If	balance	d mech	anical ve	ntilation	with hea	at recove	erv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [1 – (23c)	÷ 100]	(200)
(24a)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25]	(24a)
b) If	balance	d mech	anical ve	ntilation	without	heat rec	covery (N	и ЛV) (24b)m = (22	1 2b)m + (23b)		1	
, (24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ven	tilation c	or positiv	e input v	ventilatio	n from o	outside	!	!		1	
i	f (22b)m	າ < 0.5 >	(23b), t	hen (24c	c) = (23b); otherv	wise (24	c) = (22k	o) m + 0	.5 × (23t	D)	-		
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) lf i	natural v f (22b)m	ventilation = 1, the	on or whe en (24d)	ole hous m = (22t	e positiv)m othe	ve input v erwise (2	ventilatio 4d)m =	on from l 0.5 + [(2	oft 2b)m² x	0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effec	ctive air	change	rate - en	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-		
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. He	at losses	s and he	eat loss r	paramete	er:									
ELEN	IENT	Gros area	ss (m²)	Openin m	gs ²	Net Ar A ,r	ea n²	U-valı W/m2	ue K	A X U (W/	K)	k-value kJ/m²·I	e K	A X k kJ/K
Doors			、			2.1	x	1.2	=	2.52	,			(26)
Window	ws Type	1				6.582	<u>x</u> 1	/[1/(0.9)+	0.04] =	5.72				(27)
Window	ws Type	2				6.275	; x1,	/[1/(0.9)+	0.04] =	5.45				(27)
Walls 1	Type1	54.4	9	12.86	5	41.64		0.15		6.25				(29)
Walls 1	Tvpe2	30.5	8	21		28.48	<u> </u>	0.14		4 0.3			4 -	(29)
Roof		72	1			72.1		0.12		8.65			4 -	(30)
Total a	rea of el	lements	. m²			157 1	7	0.12		0.00	L			(31)
Party v	vall		,			13.1	<u>, </u>	0		0				(32)
Party fl	loor					72.1		0		0	L		\dashv	(322)
* for wind	dows and le the area	roof wind	ows, use e sides of in	ffective wil ternal wall	ndow U-va is and part	alue calcula	ated using	ı formula 1	/[(1/U-valu	ue)+0.04] a	L as given in	paragraph	L 1 3.2	(020)
Fabric	heat los	s, W/K	= S (A x	U)				(26)(30)	+ (32) =				32.62	2 (33)
Heat ca	apacity (Cm = S((Axk)	,					((28).	(30) + (3	2) + (32a).	(32e) =	8329.5	56 (34)
Therma	al mass	parame	ter (TMF	• = Cm ÷	- TFA) ir	n kJ/m²K			Indica	ative Value	: Medium		250	(35)
For desi can be u	gn assess ised instea	ments wh ad of a de	ere the dei tailed calcu	tails of the ılation.	constructi	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
Therma	al bridge	es : S (L	x Y) calo	culated u	using Ap	pendix ł	<						5.76	(36)
if details	of therma	l bridging	are not kn	own (36) =	: 0.05 x (3	1)								
Total fa	abric hea	at loss							(33) +	- (36) =			38.38	3 (37)
Ventila	tion hea	t loss ca	alculated	monthly	/				(38)m	= 0.33 × ((25)m x (5))	1	
(00)-	Jan	Feb	Mar	Apr	May	Jun		Aug	Sep	Oct	Nov	Dec		(20)
(38)m=	16.06	15.88	15./1	14.83	14.65	13.78	13.78	13.6	14.13	14.65	15.01	15.36	l	(38)
Heat tr	ansfer c	oefficie	nt, W/K		50.01			-	(39)m	i = (37) + (38)m		1	
(39)m=	54.44	54.27	54.09	53.21	53.04	52.16	52.16	51.98	52.51	53.04	53.39	53.74	E0 47	z _ (20)
Stroma F	-SAP 2012	2 Version	: 1.0.5.16 (SAP 9.92)	 http://ww 	ww.stroma	.com			Average =	Sum(39)1	12 / 12=	53.1p	<u>'age 2 of 🔊 /</u>

DER WorkSheet: New dwelling design stage

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	0.76	0.75	0.75	0.74	0.74	0.72	0.72	0.72	0.73	0.74	0.74	0.75		
Numbe	er of dav	s in mo	nth (Tab	le 1a)					/	Average =	Sum(40)1.	12 /12=	0.74	(40)
i turno e	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
I													1	
4. Wa	ter heat	ing enei	rgy requ	irement:								kWh/ye	ear:	
Assum if TF	ed occu A > 13.9 A £ 13.9	pancy, l), N = 1), N = 1	N + 1.76 x	: [1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (1	ΓFA -13.	<u>2</u> .9)	.3]	(42)
Annual Reduce not more	average the annua that 125	e hot wa I average litres per f	ater usag hot water person pel	ge in litre usage by r day (all w	es per da 5% if the a vater use, l	ay Vd,av Iwelling is hot and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us	se target o	88 f	.73		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage in	n litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)					1	
(44)m=	97.61	94.06	90.51	86.96	83.41	79.86	79.86	83.41	86.96	90.51	94.06	97.61		
	!									Fotal = Su	m(44) ₁₁₂ =		1064.79	(44)
Energy o	content of	hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	n x nm x D	0Tm / 3600) kWh/mon	th (see Ta	ables 1b, 1	c, 1d)	1	
(45)m=	144.75	126.6	130.64	113.89	109.28	94.3	87.38	100.27	101.47	118.26	129.09	140.18		-
lf instant	aneous w	ater heatii	ng at point	t of use (no	hot water	^r storage),	enter 0 in	boxes (46) to (61)	Fotal = Su	m(45) ₁₁₂ =		1396.11	(45)
(46)m=	21.71	18.99	19.6	17.08	16.39	14.15	13.11	15.04	15.22	17.74	19.36	21.03		(46)
Water	storage	loss:											1	
Storag	e volum	e (litres)	includir	ng any se	olar or W	/WHRS	storage	within sa	ame ves	sel	(0		(47)
If comr	nunity h	eating a	ind no ta	ank in dw	velling, e	nter 110	litres in	(47) mbi boil	oro) onto	or (0) in (47)			
Water	storade	loss:	not wate	er (uns n	iciuues i	nstantai	ieous co		ers) ente		47)			
a) If m	anufacti	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				(0		(48)
Tempe	rature fa	actor fro	m Table	2b							(0		(49)
Energy	lost fro	m water	storage	e, kWh/ye	ear			(48) x (49)) =		1'	10		(50)
b) If m	anufacti	urer's de	eclared of	cylinder	oss fact	or is not	known:						1	(= .)
Hot wa	iter stora nunity h	age loss eating s	ractor fi	on 4.3	e z (kvv	n/litre/da	iy)				0.	02		(51)
Volume	e factor i	from Ta	ble 2a								1.	03		(52)
Tempe	rature fa	actor fro	m Table	2b							0	.6		(53)
Energy	lost fro	m water	storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter	(50) or (54) in (5	55)								1.	03		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)r	n				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3						(0]	(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(moc	dified by	factor fi	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	alculated	for eac	:h ı	month ((61)m =	(60)) ÷ 36	65 × (41))m								
(61)m=	0	0	0		0	0		0	0	0)	0	0	0	(0		(61)
Total h	eat rec	uired for	water	he	ating ca	alculated	d fo	r eac	h month	(62)	m =	0.85 × ((45)m ·	+ (46)m +	· (57))m +	(59)m + (61)m	
(62)m=	200.02	176.52	185.91		167.39	164.56	1	47.8	142.66	155	.55	154.97	173.5	3 182.58	195	5.46		(62)
Solar DH	- IW input	calculated	using Ap	ppe	ndix G or	Appendi	×Н	(negati	ve quantity	/) (ent	er '0	' if no sola	r contrib	ution to wat	er hea	ating)		
(add a	dditiona	al lines if	FGHR	Sa	and/or V	WWHR	S ap	plies	, see Ap	penc	lix C	G)						
(63)m=	0	0	0	Τ	0	0		0	0	0)	0	0	0	(0		(63)
Output	from w	ater hea	ter											-				
(64)m=	200.02	176.52	185.91		167.39	164.56	1	47.8	142.66	155	.55	154.97	173.5	3 182.58	195	5.46		
		•	•								Outp	but from w	ater hea	ter (annual)	112		2046.95	(64)
Heat g	ains fro	m water	heatin	g, I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	< [(46)r	n + (57)m	า + (5	59)m]	
(65)m=	92.35	82.04	87.66	T	80.66	80.56	7	4.15	73.28	77.	56	76.53	83.54	85.72	90	.83		(65)
inclu	de (57)m in calo	ulatior	י ו סו	f (65)m	only if a	zylii	nder i	s in the c	dwell	ing	or hot w	ater is	from con	nmun	nity h	eating	
5. Int	ernal a	ains (see	e Table	5	and 5a):	-				Ū						U	
Metab	olic dai	ns (Table	5) W	atte	2													
metab	Jan	Feb	Mar		Apr	Mav		Jun	Jul	A	ua	Sep	Oct	Nov		Dec		
(66)m=	114.81	114.81	114.81	╈	114.81	114.81	1	14.81	114.81	114	.81	114.81	114.8	1 114.81	114	4.81		(66)
Lightin	n dains	. (calcula	L ted in A	- L Anr	oendix l	equat	tion	190	rl9a)a	l Iso s	ee -	I Table 5	1					
(67)m=	18.44	16.37	13.32		10.08	7.54		6.36	6.87	8.9)4	11.99	15.23	17.77	18	.95		(67)
Applia				 in	Annone			tion	13 or 1	3-2)	alec		blo 5					
Appilai	202 16	204 25	108 07	7	700000	173 51	lua I 1		151 24	140	aisu 14	154 43		3 179.89	103	3 24		(68)
	202.10	204.23				175.01			or 145 o		. 14			179.09	130	5.24		(00)
COOKIN				Ар Т		L, equa	tior	1 L15	or L15a)), ais	0 SE		5	24.49		40	I	(60)
(69)11=	34.46	. 34.40	34.40	_	34.40	34.40		94.40	34.40	34.	40	34.46	34.40	34.46	34	.40		(09)
Pumps	s and fa	ins gains		58	a)		1								1	•	I	(70)
(70)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(70)
Losses	s e.g. e	vaporatic	on (neg	ati	ve valu	es) (Tal	ole T	5)		-					-		I	<i>(</i> - <i>i</i>)
(71)m=	-91.84	-91.84	-91.84	·	-91.84	-91.84	-9	91.84	-91.84	-91	.84	-91.84	-91.84	-91.84	-91	.84		(71)
Water	heating	gains (T	able 5)			-										I	
(72)m=	124.13	122.08	117.82	2	112.03	108.28	1	02.99	98.49	104	.25	106.3	112.29	9 119.05	122	2.08		(72)
Total i	nterna	l gains =						(66)	m + (67)m	1 + (68 -	3)m -	+ (69)m + i	(70)m +	(71)m + (72	2)m			
(73)m=	402.16	400.15	387.55	;	367.27	346.76	3	26.95	314.04	319	.77	330.16	350.64	4 374.15	391	1.71		(73)
6. So	lar gain	s:																
Solar g	ains are	calculated	using so	lar	flux from	Table 6a	and	assoc	iated equa	tions	to co	onvert to th	e applic	able orienta	ation.			
Orienta	ation:	Access F Table 6d	actor		Area			Flu Tal	X ble 6a		т	g_ able 6b		FF Table 6c			Gains	
N 1 (1	1							- Tai		1	·		_				(**)	-
North	0.9x	0.77		x	6.5	58	x	1	0.63	X		0.35	×	0.8		=	13.58	(74)
North	0.9x	0.77		x	6.5	58	x	2	20.32	×		0.35	×	0.8		=	25.95	(74)
North	0.9x	0.77		x	6.5	58	x	3	34.53	×		0.35	×	0.8		=	44.1	(74)
North	0.9x	0.77		x	6.5	58	x	5	5.46	×		0.35	×	0.8		=	70.84	(74)
North	0.9x	0.77		x	6.5	58	x	7	4.72	×		0.35	x	0.8		=	95.42	(74)

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

				5					2				,					
North	0.9x	0.77		x	6.5	8	x	7	9.99	x		0.35	×	0.8		=	102.16	(74)
North	0.9x	0.77		x	6.5	8	x	7	4.68	×		0.35	×	0.8		=	95.37	(74)
North	0.9x	0.77		x	6.5	8	x	5	9.25	x		0.35	×	0.8		=	75.67	(74)
North	0.9x	0.77		x	6.5	8	x	4	1.52	×		0.35	×	0.8		=	53.02	(74)
North	0.9x	0.77		x	6.5	8	x	2	4.19	×		0.35	×	0.8		=	30.89	(74)
North	0.9x	0.77		x	6.5	8	x	1	3.12	x		0.35	×	0.8		=	16.75	(74)
North	0.9x	0.77		x	6.5	8	x	8	3.86	×		0.35	×	0.8		=	11.32	(74)
East	0.9x	0.77		x	6.2	8	x	1	9.64	x		0.35	×	0.8		=	23.91	(76)
East	0.9x	0.77		x	6.2	8	x	3	8.42	x		0.35	×	0.8		=	46.78	(76)
East	0.9x	0.77		x	6.2	8	x	6	3.27	x		0.35	×	0.8		=	77.04	(76)
East	0.9x	0.77		x	6.2	8	x	9	2.28	×		0.35	×	0.8		=	112.36	(76)
East	0.9x	0.77		x	6.2	8	x	1.	13.09	x		0.35	×	0.8		=	137.7	(76)
East	0.9x	0.77		x	6.2	8	x	1	15.77	x		0.35	×	0.8		=	140.96	(76)
East	0.9x	0.77		x	6.2	8	x	1	10.22	x		0.35	×	0.8		=	134.2	(76)
East	0.9x	0.77		x	6.2	8	x	9	4.68	x		0.35	×	0.8		=	115.28	(76)
East	0.9x	0.77		x	6.2	8	x	7	3.59	×		0.35	×	0.8		=	89.6	(76)
East	0.9x	0.77		x	6.2	8	x	4	5.59	×		0.35	×	0.8		=	55.51	(76)
East	0.9x	0.77		x	6.2	8	x	2	4.49	×		0.35	×	0.8		=	29.82	(76)
East	0.9x	0.77		x	6.2	8	x	1	6.15	x		0.35	×	0.8		=	19.67	(76)
	-									•								
Solar g	gains in	watts, ca	alculat	ed	for each	n month	۱.			(83)m	n = Su	um(74)m	(82)m					
(83)m=	37.49	72.73	121.1	4	183.2	233.13	2	43.12	229.58	190	.95	142.63	86.4	46.57	30.9	99		(83)
Total g	jains – i	nternal a	and so	lar	(84)m =	: (73)m	+ (83)m	, watts	-					-			
(84)m=	439.65	472.88	508.6	9	550.47	579.89	5	70.06	543.62	510	.71	472.78	437.0	4 420.72	422	2.7		(84)
7. Me	an inter	nal temp	peratur	e (heating	seasor	า)											
Temp	erature	during h	eating	g pe	eriods ir	the liv	ing	area f	rom Tab	ole 9	, Th1	1 (°C)					21	(85)
Utilisa	ation fac	tor for g	ains fo	or li	ving are	a, h1,n	n (s	ее Та	ble 9a)						_			
	Jan	Feb	Ма	r	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	D	ес		
(86)m=	1	0.99	0.98		0.94	0.8		0.58	0.42	0.4	47	0.74	0.96	0.99	1			(86)
Mean	interna	l temper	ature i	n li	iving are	ea T1 (f	ollo	w ste	ps 3 to 7	in T	able	e 9c)						
(87)m=	20.34	20.43	20.6		20.82	20.96		21	21	2	1	20.98	20.81	20.54	20.3	32		(87)
Temr	erature	durina h	eating	1 106	eriods in	rest of	- f dw	/ellina	from Ta	ble 9	9 Th	 ∩2 (°C)		•				
(88)m=	20.29	20.29	20.3	, p.	20.31	20.31		20.32	20.32	20.	32	20.32	20.31	20.31	20.	3		(88)
Litilio	L	tor for a	i Dine fe			volling	<u>ь</u>	m (cc		لــــــــــــــــــــــــــــــــــــ				-!				
(89)m=	1	0.99	0.98		0.92	0.75		0.52	0.36	9a)	4	0.68	0.94	0.99	1			(89)
(00)11-		0.00	0.00		0.02	0.10		0.0L	0.00	U	·	0.00	0.04	0.00	I'			()

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)11=	19.4	19.54	19.79	20.1	20.27	20.32	20.32	20.32	20.3	20.09	19.71	19.39		(90)
									1	LA = Livin	g area ÷ (4	4) =	0.36	(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

20.54 20.35 20.01 19.72	20.54	20.56	20.56	20.56	20.52	20.36	20.08	19.86	19.74	(92)m=
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Apply adjustment to the mean internal temperature from Table 4e, where appropriate

				·	·						1	,		
(93)m=	19.74	19.86	20.08	20.36	20.52	20.56	20.56	20.56	20.54	20.35	20.01	19.72		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the r	nean int	ernal ter	mperatu	re obtain	ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	llisation	Tactor IC	or gains		able 9a	lun	1.1	Aug	Son	Oct	Nov	Dee		
l Itilis:	Jan ation fac	tor for a	ains hm	Apr 	way	Jun	Jui	Aug	Sep	Oci	INOV	Dec		
(94)m=		0.99	0.98	0.92	0.77	0.54	0.38	0.42	0.7	0.94	0.99	1		(94)
Usefu	L dains.	hmGm .	W = (94	1 4)m x (8	4)m			-	-					
(95)m=	437.58	468.69	496.87	505.86	444.9	309.29	206.62	216.26	329.66	410.67	416.07	421.14		(95)
Month	nly avera	age exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	840.47	811.86	734.4	609.56	467.52	310.89	206.72	216.48	338.41	517.11	689.17	834.14		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	299.75	230.61	176.72	74.66	16.83	0	0	0	0	79.19	196.63	307.27		_
								Tota	l per year	(kWh/yeai	r) = Sum(9	8)15,912 =	1381.66	(98)
Space	e heating	g require	ement in	kWh/m²	/year								19.16	(99)
9b. En	erav rea	uiremer	nts – Cor	nmunity	heating	scheme)					L		
This pa	art is use	ed for sp	ace hea	iting, spa	ace cooli	ing or wa	ater heat	ting prov	ided by	a comm	unity sch	neme.		
Fractic	on of spa	ice heat	from se	condary	/supplen	nentary l	heating	(Table 1	1) '0' if n	one	•		0	(301)
Fractio	on of spa	ice heat	from co	mmunity	v system	1 – (30 ⁻	1) =						1	(302)
The con	nmunity sc	heme may	y obtain he	eat from se	everal sour	rces. The _f	orocedure	allows for	CHP and u	up to four	other heat	sources; tl	he latter	_
includes	boilers, h	eat pumps	s, geotherr	mal and wa	aste heat f	rom powe	r stations.	See Apper	ndix C.			I		
Fractio	on or nea	at from C	Jommun	ity neat	pump								1	(303a)
Fractio	on of tota	al space	heat fro	m Comn	nunity he	eat pump	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	iting sys ⁻	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for a	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	9											kWh/year	_
Annua	l space l	heating	requiren	nent									1381.66	
Space	heat fro	m Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	=	1450.75	(307a)
Efficier	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	requirer	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water	heating	I												
Annua	l water h	neating r	equirem	ent									2046.95	
lf DHW Water	/ from co heat froi	ommunit m Comn	ty schem nunity he	ne: eat pump	C				(64) x (30	03a) x (30	5) x (306) =	= [2149.29	(310a)
Electri	city used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	· (310a)(310e)] =	36	(313)
Coolin	g Syster	n Energ	y Efficie	ncy Rati	0								0	(314)
Space	cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
Electri	city for p	umps ai	nd fans v	within dv	vellina (1	Table 4f)	:					I		-
mecha	inical ve	ntilation	- balanc	ed, extra	act or pc	sitive in	put from	outside					175.96	(330a)

DER WorkSheet: New dwelling design stage

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	175.96	(331)
Energy for lighting (calculated in Appendix L)		325.57	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-411.43	(333)
Total delivered energy for all uses (307) + (309) + (310) + (312)	2) + (315) + (331) + (332)(237b) =	3690.14	(338)
12b. CO2 Emissions – Community heating scheme			

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water h Efficiency of heat source 1 (%)	leating (not CHP) If there is CHP using two fuels repeat (363) t	to (366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 467.11	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 18.68	(372)
Total CO2 associated with community system	IS (363)(366) + (368)(3	72)	= 485.79	(373)
CO2 associated with space heating (seconda	ry) (309) x	0	= 0	(374)
CO2 associated with water from immersion here	eater or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water h	eating (373) + (374) + (375) =		485.79	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	= 91.32	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 168.97	(379)
Energy saving/generation technologies (333) Item 1	to (334) as applicable	0.52 × 0.01 =	-213.53	(380)
Total CO2, kg/year sum c	of (376)(382) =		532.55	(383)
Dwelling CO2 Emission Rate (383)	÷ (4) =		7.39	(384)
El rating (section 14)			93.91	(385)

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documen Printed on 03 Augus Project Information	nt L1A, 2013 Edition st 2022 at 12:29:05 n:	, England assessed by Stro	oma FSAP 2012 program, Ve	rsion: 1.0.5.16	
Assessed By:	Robyn Berry (STR	D036659)	Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area: 4	19.38m ²	
Site Reference :	BP Finchlev Road		Plot Reference:	401 BP Finchlev F	٦d
Address :	401 BP Finchlev R	d London NW3.5EY		,	-
Client Details:		.,			
Name:					
Address :					
This report covers	items included wi	thin the SAP calculations			
It is not a complete	e report of regulati	ons compliance.			
1a TER and DER					
Fuel for main heatin	ng system: Electricity	/ (C)			
Fuel factor: 1.55 (el	ectricity (c))				
Target Carbon Diox	ide Emission Rate (TER)	29.16 kg/m ²		01/
1b TEEE and DEE	OXIDE EMISSION Rate	e (DER)	8.07 kg/m²		OK
Target Eabric Energy	v Efficiency (TEEE)		48 1 kWh/m²		
Dwelling Fabric Energy	erav Efficiency (DFE	E)	37.4 kWh/m ²		
J	39	/			ОК
2 Fabric U-values	;				
Element		Average	Highest		
External w	all	0.15 (max. 0.30)	0.15 (max. 0.70)		ΟΚ
Party wall		0.00 (max. 0.20)	-		OK
Floor		(no floor)			
Roof		0.10 (max. 0.20)	0.10 (max. 0.35)		OK
Openings		0.97 (max. 2.00)	1.20 (max. 3.30)		OK
2a Thermal bridgi	ing				
Thermal bi	ridging calculated fro	om linear thermal transmitta	ances for each junction		
3 Air permeability	/		0.00 (la sister al	-)	
Air permeabi Maximum	lity at 50 pascals		3.00 (design vai	ue)	OK
Maximum			10.0		
4 Heating efficien	icy	0			
Main Heating	g system:	Community heating scher	nes - Heat pump		
Secondary h	eating system:	None			
	(t.a				
5 Cylinder Insulat	lion	No outindor			
6 Controis					
Space heatin Hot water co	ng controls ntrols:	Charging system linked to No cylinder thermostat No cylinder	o use of community heating, p	programmer and TR	Vs OK

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.58m ²	
Windows facing: South East	2.94m ²	
Ventilation rate:	2.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	3.0 m ³ /m ² h	
Windows U-value	0.9 W/m²K	
Roofs U-value	0.1 W/m²K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump		

Photovoltaic array

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documer Printed on 03 Augu Project Information	nt L1A, 2013 Edition Ist 2022 at 12:29:05 n:	, England assessed by Stror	na FSAP 2012 program, Ver	sion: 1.0.5.16	
Assessed By:	Robyn Berry (STR	D036659)	Building Type:	Flat	
Dwelling Details:					
	DESIGN STAGE		Total Floor Area: 8	9 7m²	
Site Reference :	BP Finchley Road		Plot Reference:	306 BP Finchley F	24
Addross :	206 RD Einchlov P	d London NW2 5EV	i lot Kelerende.	Soo Brinneniey r	ιu
Address .	500 BF T Inchiey K	a, Eondon, NVV3 SE I			
Client Details:					
Name: Address :					
This report covers It is not a complet	s items included wi e report of regulati	thin the SAP calculations. ons compliance.			
1a TER and DER					
Fuel for main heatir	ng system: Electricity	/ (C)			
Fuel factor: 1.55 (el	lectricity (c))				
Target Carbon Diox	dide Emission Rate (TER)	23.22 kg/m ²		
Dwelling Carbon Di	oxide Emission Rate	e (DER)	5.88 kg/m²		OK
1b TFEE and DFE	:E 				
Target Fabric Energ	gy Efficiency (TFEE)		43.0 KVVN/m ²		
Dweiling Fabric Ene	ergy Eniciency (DFE		32.0 KVVII/III2		ОК
2 Fabric U-values	5				OR
Element		Average	Highest		
External w	vall	0.15 (max. 0.30)	0.15 (max. 0.70)		ОК
Party wall		0.00 (max. 0.20)	-		ОК
Floor		(no floor)			
Roof		0.12 (max. 0.20)	0.12 (max. 0.35)		ОК
Openings		0.94 (max. 2.00)	1.20 (max. 3.30)		OK
2a Thermal bridg	ing				
Thermal b	ridging calculated fro	om linear thermal transmittar	nces for each junction		
3 Air permeability	y				
Air permeab	ility at 50 pascals		3.00 (design valu	le)	
Maximum			10.0		OK
4 Heating efficier	псу				
Main Heating	g system:	Community heating schem	ies - Heat pump		
Secondary	acting overam	None			
Secondary n	leating system.	none			
5 Cylinder insula	tion				
Hot water St	orage:	No cylinder			
6 Controls					
Space best		Charging system links d to		radrommer and TD	
Hot water co	ontrols:	No cylinder thermostat No cylinder	use of community nearing, p		vo un

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North	10.44m ²	
Windows facing: East	1.53m ²	
Ventilation rate:	2.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Roofs U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump		

Photovoltaic array

DER WorkSheet: New dwelling design stage

Assessor Name: Robyn Berry: Stroma Number: STR0036659 Software Version: Version: 1.0.5.16 Address: 401 BP Finchley Rd, London, NW3 GEY Stroma PSAP 2012 Stroma PSAP 2012 Version: 1.0.5.16 Address: 401 BP Finchley Rd, London, NW3 GEY Image: Stroma PSAP 2012 Image: Stroma PSAP 2012 Image: Stroma PSAP 2012 Version: Version: 1.0.5.16 Oround floor 40.38 (1a) × 2.54 (2a) +	User Details:											
Software Name: Stoma FSAP 2012 Software Version: Version: 1.0.5.16 Departy Address: Concent address: <thconcent address:<="" th=""> <thconcent addres<="" td=""><td>Assessor Name:</td><td>Robyn</td><td>Berry</td><td></td><td></td><td>Strom</td><td>a Num</td><td>ber:</td><td></td><td>STRO</td><td>036659</td><td></td></thconcent></thconcent>	Assessor Name:	Robyn	Berry			Strom	a Num	ber:		STRO	036659	
Property Address: 401 BP Finchley Rd Address: 401 BP Finchley Rd, London, NW3 SEY Area(m?) Av. Height(m) Volume(m?) Ground floor Area(m?) Av. Height(m) Volume(m?) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Address: 40: a Volume(m?) Mumber of chinneys Secondary heating Add = O Colspan="4">Colspan="4" Mumber of chinneys Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4" Mumber of chinneys Colspan= a Colspan= a Colspan= a Colspan="4" Colspan= a Colspan= a Colspan= a <td>Software Name:</td> <td>Stroma</td> <td>FSAP 2012</td> <td>2</td> <td></td> <td>Softwa</td> <td>are Ver</td> <td>sion:</td> <td></td> <td>Versic</td> <td>n: 1.0.5.16</td> <td></td>	Software Name:	Stroma	FSAP 2012	2		Softwa	are Ver	sion:		Versic	n: 1.0.5.16	
Address : 1. Overall dwelling dimensions: Area(m ²) Av. Height(m) Volume(m ³) Ground floor Area(m ²) Av. Height(m) Volume(m ³) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) (a.3a) (a) Volume(m ³) Overall diveling volume (a) Volume(m ³) Vertilation rate: m ³ per hour Number of chinneys Secondary ofter total m ³ per hour Number of passive vents o vilce vilce vilce vilce vilce vilce vilce vilce <th< td=""><td></td><td></td><td></td><td>P</td><td>roperty /</td><td>Address:</td><td>401 BP</td><td>Finchle</td><td>y Rd</td><td></td><td></td><td></td></th<>				P	roperty /	Address:	401 BP	Finchle	y Rd			
A rea(m?) Av. Height(m) Volume(m?) Ground floor (1) Volume(m?) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) (4) (a) (a) (a) O (a) <th colspan="</td> <td>Address :</td> <td>401 BP</td> <td>Finchley Rd,</td> <td>Londor</td> <td>n, NW3 5</td> <td>5EY</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Address :	401 BP	Finchley Rd,	Londor	n, NW3 5	5EY						
Area(m ²) AV. Height(m) Volume(m ²) Ground floor 49.38 (1a) 2.54 (2a) 125.44 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.38 (1a) 2.54 (2a) 125.44 (3a) Dwelling volume (1a)+(3b)+(3c)+(3d)+(3e)+(3n) 125.44 (5) 2 Ventilation rate ascondary other total m ³ per hour Number of chimneys 0 + 0 = 0 x40 = 0 (6e) Number of open flues 0 + 0 = 0 x10 = 0 (7o) Number of passive vents 0 x10 = 0 (7o) 0 (1a) (1b) 0 (7o) Number of flueless gas fires 0 x10 = 0 (7o) 0 (1a) 0 (1b) 0 (1b) 0 (1c) 0 </td <td>1. Overall dwelling dim</td> <td>nensions:</td> <td></td> <td></td> <td><u>.</u></td> <td>()</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	1. Overall dwelling dim	nensions:			<u>.</u>	()						
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 43.38 (4) Dwelling volume (3a)+(3b)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c	Ground floor				Area	a(m²) 9.38	(1a) x	Av. He	ight(m) .54	(2a) =	Volume(m ³ 125.44	(3a)
Detelling volume (3a)+(3b)+(3c)+(3c)+(3c)+(3c)+((3r)) = (125,44 (5) 2. Ventilation rate: main heating 10 mber of chimneys 0 + 0 + 0 = 0 x40 = 0 (6a) Number of passive vents 0 + 0 = 0 x10 = 0 (7a) Number of numeritient fans 0 x10 = 0 (7b) 0 x40 = 0 (7c) Number of flueless gas fires 0 x10 = 0 (7c) 0 x40 = 0 (7c) Number of storeys in the dwelling (ns) $x40 =$ 0 (7c) 0 (9) (10) Additional infiltration (9)-1(bo.1 = 0 (10) 0 (10) 0 (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masomy construction 0 (12) 0 (13) If buspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (13) 0 (14) If no draught lobby, enter 0.05, else enter 0 0 0 (13) 0 (14) 0 (15) 0<	Total floor area TFA = (1a)+(1b)+(1	c)+(1d)+(1e))+(1n) 4	9.38	(4)					
2. Ventilation rate:main heating 0secondary heating +othertotalm³ per hourNumber of open flues0+0=0x40 =0(6a)Number of open flues0+0=0x40 =0(7a)Number of intermittent fans0x10 =0(7a)0x10 =0(7b)Number of flueless gas fires0x40 =0(7c)0x40 =0(7c)Infitration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =0++00(7c)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue fram (9) to (16)Number of storeys in the dwelling (ns)((9)+1)±0.1 =0(10)Number of storeys in the dwelling (ns)((9)+1)±0.1 =0(10)(10)(10)Structural infitration(25 for steel or timber frame or 0.35 for masonry construction(10)+1)±0.1 =0(11)if but types of wall are present, use the value corresponding to the greater wall area (after deducing areas of openings); if equal user 0.350(12)(13)If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00(12)(13)Percentage of windows and doors draught stripped0(14)(10) =(15)Window infiltration0.25 -(0.2 x (14) + 100) =(16)(16)(15)Air permeability value, efoo, expressed in cubic metres per hour per square metre of envelope area3(17) <td>Dwelling volume</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(3a)+(3b)</td> <td>+(3c)+(3d</td> <td>)+(3e)+</td> <td>.(3n) =</td> <td>125.44</td> <td>(5)</td>	Dwelling volume						(3a)+(3b)	+(3c)+(3d)+(3e)+	.(3n) =	125.44	(5)
Mailing heatingSecondary heatingOnlerColarImplementationNumber of chimneys 0 $+$ 0 $=$ 0 40 $=$ 0 $(6a)$ Number of passive vents 0 $+$ 0 $=$ 0 $x10$ $=$ 0 $(7a)$ Number of flueless gas fires 0 $x10$ 0 $x10$ 0 $(7a)$ Number of flueless gas fires 0 $x40$ 0 $(7c)$ 0 Number of storeys in the dwelling (ns) 0 $x40$ 0 $(7c)$ Additional infiltration((9)-(7a)+(7b)+(7c)) = 0 $+$ 0 0 Number of storeys in the dwelling (ns) 0 0 0 0 0 Additional infiltration((9)-(1)x.0.1 = 0 (10) 0 (11) Structural infiltration((9)-(1)x.0.1 = 0 (12) 0 (13) Percentage of waid are present, use the value corresponding to the greater wall area (after deducting areas of openings); it equal user 0.35 0 0 (14) Window infiltration $0.25 - [0.2 \times (14) + 100] =$ 0 (15) 0 (14) Window infiltration rate (2) (10) (11) $(12) + (13) + (15) =$ 0 (15) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (77) 0 0 (12) Additional infiltration rate 0.0 $0.25 - [0.2 \times (14) + 100] =$ 0 (12) 0 (13)	2. Ventilation rate:					othou		totol			m3 nor hou	-
Number of chimneys 0 + 0 + 0 = 0 x40= 0 (6s)Number of open flues 0 + 0 + 0 = 0 x20 0 (6s)Number of passive vents 0 $x10$ 0 $(7a)$ 0 $x10$ 0 $(7a)$ Number of passive vents 0 $x10$ 0 $(7a)$ 0 $x40$ 0 $(7c)$ Number of storeys in the dwelling (ns)Additional infiltration $(6b)$ $(7a)$ 0 $(6b)$ $(7b)$ $(7b)$ 0 (9) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (10) (11) <i>i</i> but types of wall are present, use the value corresponding to the greater wall area (after deducting rease of openings); if equal user 0.5 $0.25 \cdot [0.2 \times (14) + 100] =$ 0 (12) If no draught lobby, enter 0.05 , else enter 0 $0.25 \cdot [0.2 \times (14) + 100] =$ 0 (14) Window infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0 (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0 (15) Infiltration rate $(20) + 1 \cdot [0.075 \times (19)] =$ 0 (15) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.12 (21) Number of sides sheltered $2 + (20) = 1 \cdot [0.075 \times (19)] =$ 0.12 (21) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.12 (21) Inf		heat	ing se	eating	у	otner	_	total			m ³ per nou	r
Number of open flues0+0=0 220 0(6b)Number of intermittent fans0 10 0(7a)Number of passive vents0 10 0(7b)Number of flueless gas fires0 10 0(7c)Number of storeys in the dwelling (ns)0 40 0(7c)Additional infiltration0.25 for steel or timber frame or 0.35 for masonry construction(8)0If both pass of vall are present, use the value corresponding to the greater wall area (after deducting areas of openings): if equal user 0.350(12)If no draught lobby, enter 0.05, else enter 00(13)0(14)Percentage of windows and doors draught stripped0(14)0(14)Window infiltration rate(20) enter 0.05, expressed in cubic metres per hour per square metre of envelope area(17)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area(15)(16)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used3(19)Number of sides shellered00.15(18)(20) =0.12Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used3(19)Air permeabili	Number of chimneys	(0 +	0	+	0] = [0	x 4	40 =	0	(6a)
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Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.12 (21) Infiltration rate modified for monthly wind speed $\boxed{Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec}$ $\boxed{Monthly average wind speed from Table 7}$ $(22)m =$ $\boxed{5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7}$ Wind Factor $(22a)m = (22)m \div 4$ $\underbrace{1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18}$	Shelter factor					(20) = 1 -	[0.075 x (1	9)] =			0.78	(20)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4 (22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.92 1 1.08 1.12 1.18	Infiltration rate incorport	ating shelter	r factor			(21) = (18)) x (20) =				0.12	(21)
JanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7 $(22)m=$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m $\div 4$ $(22a)m=$ 1.27 1.25 1.23 1.1 1.08 0.95 0.92 1 1.08 1.12 1.18	Infiltration rate modified	for monthly	v wind speed									
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m $\div 4$ (22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.92 1 1.08 1.12 1.18	Jan Feb	Mar A	pr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4 (22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.92 1 1.08 1.12 1.18	Monthly average wind s	speed from	Table 7									
Wind Factor (22a)m = (22)m \div 4(22a)m=1.271.251.231.11.080.950.9211.081.121.18	(22)m= 5.1 5	4.9 4.	4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	Wind Factor (22a)m = (22)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		

DER WorkSheet: New dwelling design stage

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Adjuste	ed infiltra	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m						
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14			
Calcula If me	ate ettec echanica	tive air I ventila	<i>change i</i> ition:	rate for t	he appli	cable ca	se						0.5	(2	(22)
lf exh	aust air he	eat pump	using Appe	endix N, (2	3b) = (23a) × Fmv (e	equation (N	√5)) , othe	rwise (23b) = (23a)			0.5	(2	3h)
lf bala	anced with	heat reco	overy: effici	iency in %	allowing f	or in-use fa	actor (from	n Table 4h) =	, , ,			76.5	(2	(3c)
a) If	balance	d mech	, anical ve	ntilation	with her	at recove	ərv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [1 – (23c)	- 1001	(2)	00)
(24a)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2	4a)
b) If	balance	d mecha	anical ve	ntilation	without	heat rec	: overv (N	и ЛV) (24b	m = (22)	1 2b)m + (23b)		1		
, (24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(2	4b)
c) If	whole ho	ouse ex	tract ven	tilation c	or positiv	e input v	/entilatic	n from c	utside				1		
í	if (22b)m	n < 0.5 ×	(23b), t	hen (240	;) = (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]	(24	4c)
d) lf i	natural \ if (22b)m	ventilation = 1, the	on or whe	ole hous m = (22t	e positiv)m othe	ve input v erwise (2	ventilatio 4d)m = 0	on from l 0.5 + [(2	oft 2b)m² x	0.5]					
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24	4d)
Effe	ctive air	change	rate - en	iter (24a) or (24b	o) or (240	c) or (24	d) in boy	(25)	_	_	_	-		
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2	5)
3. He	at losses	s and he	eat loss r	paramete	er:										
ELEN	IENT	Gros area	3S (m²)	Openin m	gs ²	Net Ar A .r	ea n²	U-valı W/m2	ue K	A X U (W/	K)	k-value kJ/m²·I	e K	A X k kJ/K	
Doors			、 ,			2.1	x	1.2	=	2.52	,			(2	.6)
Windo	ws Type	1				4.584	x1/	/[1/(0.9)+	0.04] =	3.98	\exists			(2	7)
Windov	ws Type	2				2.936		/[1/(0.9)+	0.04] =	2.55	=			(2	7)
Walls ⁻		38.3	37	7.52		30.85		0.15		4.63					.9)
Walls ⁻		23.8	36	21		21.76		0.14		3.08	= 1		\exists	` (2	9)
Roof	71 -	49.3	18			49.38		0.1	⊣ _	4 94	=		\exists	(3	-, (0)
Total a	rea of el	lements	. m²	L		111.6	2	0.1		+.0+	L			(°	
Party v	vall		,			18.73		0		0	r			(3	·)
Party f	loor					40.20		0		0	L 			(3	-) (22)
* for win	dows and	roof wind	ows, use e sides of in	ffective wil	ndow U-va s and part	alue calcula	, ated using	formula 1	/[(1/U-valı	ıe)+0.04] a	L as given in	paragraph	L 1 3.2	(0.	24)
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				21.7	(3	3)
Heat c	apacity (Cm = S((Axk)	,					((28).	(30) + (3	2) + (32a).	(32e) =	6419.4	43 (3	.4)
Therm	al mass	parame	ter (TMF	? = Cm ÷	TFA) in	ı kJ/m²K			Indica	itive Value	: Medium		250	(3	5)
For desi can be u	gn assess Ised instea	ments wh ad of a de	ere the de tailed calcu	tails of the ılation.	constructi	on are not	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f			
Therm	al bridge	es : S (L	x Y) cale	culated u	using Ap	pendix ł	<						5.03	(3	6)
if details	of therma	l bridging	are not kn	own (36) =	0.05 x (3	1)									
Total fa	abric hea	at loss							(33) +	· (36) =			26.73	3 (3	7)
Ventila	ition hea	t loss ca	alculated	monthly	/ 				(38)m	= 0.33 × ((25)m x (5))	1		
(00) -	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		10	0)
(38)m=	11	10.88	10.76	10.16	10.04	9.44	9.44	9.32	9.68	10.04	10.28	10.52	l	(3)	0)
Heat tr	ansfer c	oefficier	nt, W/K				00 / -	0.0.0.1	(39)m	= (37) + (38)m	0- 6-	1		
(39)m=	37.73	37.61	37.49	36.89	36.77	36.16	36.16	36.04	36.4	36.77	37.01	37.25	20.00		(0)
Stroma I	-SAP 2012	2 Version:	: 1.0.5.16 (SAP 9.92)	 http://ww 	vw.stroma	.com			Average =	Sum(39)1	12 / 12=	30.8	<u>'age 2 </u>	0)

DER WorkSheet: New dwelling design stage

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	0.76	0.76	0.76	0.75	0.74	0.73	0.73	0.73	0.74	0.74	0.75	0.75		
Numbe	er of dav	s in moi	nth (Tab	le 1a)					ļ	Average =	Sum(40)1.	.12 /12=	0.75	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
I			ļ			<u> </u>	<u> </u>							
4. Wa	ter heat	ing enei	rgy requ	irement:								kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1													(42)	
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 73.91 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)												(43)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	81.3	78.34	75.39	72.43	69.48	66.52	66.52	69.48	72.43	75.39	78.34	81.3		
										Fotal = Su	m(44) ₁₁₂ =		886.92	(44)
Energy o	content of	hot water	used - cal	culated me	onthly = 4.	190 x Vd,r	n x nm x D	0Tm / 3600) kWh/mon	th (see Ta	ables 1b, 1	c, 1d)		
(45)m=	120.57	105.45	108.81	94.87	91.03	78.55	72.79	83.52	84.52	98.5	107.52	116.76		-
lf instant	aneous w	ater heatii	ng at point	t of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	Fotal = Su	m(45) ₁₁₂ =		1162.9	(45)
(46)m=	18.09	15.82	16.32	14.23	13.65	11.78	10.92	12.53	12.68	14.78	16.13	17.51		(46)
Water	storage	loss:		1									1	
Storage	e volum	e (litres)	includir	ng any se	olar or W	/WHRS	storage	within sa	ame vess	sel	(0		(47)
If comr	nunity h	eating a	ind no ta	ank in dw	/elling, e	nter 110	litres in	(47)			47)			
Water :	ise ii no storage	loss:	not wate	er (this ir	iciudes i	nstantar	ieous co	nod idm	ers) ente	er u in (47)			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):				()		(48)
Tempe	rature fa	actor fro	m Table	2b)		(49)
Energy	lost fro	m water	· storage	e, kWh/ye	ear			(48) x (49)	=		1	10		(50)
b) If m	anufact	urer's de	eclared of	cylinder	oss fact	or is not	known:							
Hot wa	ter stora	age loss	factor fr	rom Tabl	e 2 (kW	h/litre/da	ıy)				0.	02		(51)
Volume	e factor	from Ta	ble 2a	011 4.5							1	03		(52)
Tempe	rature fa	actor fro	m Table	2b							0	.6		(52)
Energy	lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =	1.	03		(54)
Enter	(50) or (54) in (5	55)								1.	03		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)r	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	r contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)i	m where (H11) is fro	m Append	lix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (ar	nnual) fro	om Table	e 3						(D		(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(moc	lified by	factor fi	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		I	(50)
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	lculated	for eacl	n month	(61)m =	(60) ÷ 36	5 × (41))m								
(61)m=	0	0	0	0	0		0	0	0		0	0	0	0)		(61)
Total h	eat req	uired for	water h	eating c	alculated	l fo	r each	n month	(62)ı	m =	0.85 × ((45)m +	(46)m +	(57)ı	m +	(59)m + (61)m	
(62)m=	175.84	155.38	164.09	148.36	146.3	13	32.04	128.06	138	5.8	138.02	153.78	161.02	172	.04		(62)
Solar DH	IW input	calculated	using Ap	pendix G o	r Appendix	с Н (negativ	e quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	er hea	ting)	I	
(add a	dditiona	al lines if	FGHRS	and/or	WWHRS	ap	plies,	see Ap	pend	lix G	3)						
(63)m=	0	0	0	0	0		0	0	0		0	0	0	0)		(63)
Output	from w	ater hea	ter														
(64)m=	175.84	155.38	164.09	148.36	146.3	13	32.04	128.06	138	8.8	138.02	153.78	161.02	172	.04		_
										Outp	out from wa	ater heate	er (annual)₁	12		1813.74	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m] + 0.8 ×	(46)m	+ (57)m	+ (5	9)m]	
(65)m=	84.31	75	80.4	74.34	74.49	6	8.91	68.42	71.9	99	70.9	76.97	78.55	83.	05		(65)
inclu	de (57)	m in calo	culation	of (65)m	only if c	ylir	nder is	in the c	dwell	ing	or hot w	ater is f	rom com	muni	ity h	eating	
5. Int	ernal g	ains (see	Table	5 and 5a):												
Metabo	olic gair	ns (Table	e 5), Wa	tts													
	Jan	Feb	Mar	Apr	May	,	Jun	Jul	Aı	ug	Sep	Oct	Nov	D	ec		
(66)m=	83.6	83.6	83.6	83.6	83.6	8	33.6	83.6	83.	6	83.6	83.6	83.6	83.	.6		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion	L9 or	L9a), a	lso s	ee ⁻	Table 5						
(67)m=	13.68	12.15	9.88	7.48	5.59	4	1.72	5.1	6.6	3	8.9	11.3	13.19	14.	06		(67)
Appliar	nces ga	ins (calc	ulated i	n Appen	dix L, eq	uat	ion L1	3 or L1	3a), a	also	see Ta	ble 5	8			1	
(68)m=	145.64	147.15	143.34	135.23	125	11	15.38	108.95	107.	.44	111.25	119.36	129.59	139	.21		(68)
Cookin	ig gains	s (calcula	ted in A	ppendix	L, equat	tion	1 L15 o	or L15a)	, als	o se	e Table	5				'	
(69)m=	31.36	31.36	31.36	31.36	31.36	3	1.36	31.36	31.3	36	31.36	31.36	31.36	31.	36		(69)
Pumps	and fa	ns gains	(Table	5a)												I	
(70)m=	0	0	0	0	0		0	0	0		0	0	0	0)		(70)
Losses	s e.g. e	/aporatio	n (nega	ative valu	ies) (Tab	le t	5)							•		I	
(71)m=	-66.88	-66.88	-66.88	-66.88	-66.88	-6	6.88	-66.88	-66.	88	-66.88	-66.88	-66.88	-66.	.88		(71)
Water	heating	gains (T	able 5)	•		•										I	
(72)m=	113.32	111.61	108.07	103.25	100.12	9	5.71	91.97	96.7	77	98.47	103.46	109.09	111	.62		(72)
Total i	nterna	gains =					(66)	m + (67)m	ı + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72)	m		I	
(73)m=	320.72	318.99	309.37	294.04	278.79	26	63.89	254.1	258.	.92	266.7	282.2	299.96	312	.97		(73)
6. Sol	lar gain	s:		•	•									J			
Solar g	ains are	calculated	using sola	ar flux from	Table 6a	and	associa	ated equa	tions f	to co	nvert to th	e applica	ble orientat	ion.			
Orienta	ation:	Access F	actor	Area	l		Flux	x		-	g_	-	FF			Gains	
	-	l able 6d		m²		_	Tab	ole 6a		I	able 6b		able 6c			(VV)	_
Southea	ast <mark>0.9</mark> x	0.77	×	2.	94	x	30	6.79	x		0.35	x	0.8		=	20.96	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.	94	×	62	2.67	x		0.35	x	0.8		=	35.71	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.	94	×	8	5.75	x		0.35	x	0.8		=	48.85	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.	94	x	10	6.25	x		0.35	x	0.8		=	60.53	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.	94	x	11	9.01	x		0.35	x	0.8		=	67.8	(77)

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

				5					5				,					
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	1	18.15	x		0.35	x	0.8		=	67.31	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	1	13.91	x		0.35	x	0.8		=	64.89	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	1	04.39	x		0.35	x	0.8		=	59.47	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	9	92.85	x		0.35	x	0.8		=	52.9	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	6	69.27	x		0.35	x	0.8		=	39.46	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	4	14.07	x		0.35	x	0.8		=	25.11	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	3	31.49	x		0.35	x	0.8		=	17.94	(77)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	3	36.79]		0.35	x	0.8		=	32.73	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	6	62.67]		0.35	x	0.8		=	55.75	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	8	35.75]		0.35	x	0.8		=	76.28	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	1	06.25]		0.35	x	0.8		=	94.51	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	1	19.01]		0.35	x	0.8		=	105.86	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	1	18.15]		0.35	x	0.8		=	105.09	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	1	13.91]		0.35	x	0.8		=	101.32	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	1	04.39]		0.35	x	0.8		=	92.85	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	9	92.85]		0.35	x	0.8		=	82.59	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	6	69.27]		0.35	x	0.8		=	61.61	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	4	14.07			0.35	x	0.8		=	39.2	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	4.5	8	x	3	31.49]		0.35	x	0.8		=	28.01	(79)
	_						-			-						-		_
Solar g	gains in	watts, ca	alculate	ed	for each	n mont	th			(83)m	n = Su	m(74)m .	(82)m		r			
(83)m=	53.69	91.45	125.13	3	155.04	173.66	6	172.4	166.21	152	2.32	135.49	101.07	7 64.31	45.	95		(83)
Total g	gains – i	internal a	and sol	ar	(84)m =	: (73)n	1 +	(83)m	, watts									
(84)m=	374.41	410.45	434.5		449.08	452.4	5	436.3	420.32	411	.24	402.19	383.2	7 364.26	358	.92		(84)
7. Me	ean inte	rnal temp	peratur	e (heating	seasc	on)											
Temp	perature	during h	neating	pe	eriods in	the liv	ving	area	from Tal	ole 9	, Th1	(°C)					21	(85)
Utilisa	ation fac	ctor for g	ains fo	r li	ving are	a, h1,	m (:	see Ta	ble 9a)									
	Jan	Feb	Mar		Apr	May	/	Jun	Jul	A	ug	Sep	Oct	Nov	D	ec		
(86)m=	0.99	0.98	0.95		0.88	0.73		0.53	0.38	0.	.4	0.62	0.88	0.97	0.9	99		(86)
Mear	interna	al temper	ature i	n li	iving are	a T1 ((foll	ow ste	ps 3 to 7	7 in T	Table	9c)						
(87)m=	20.47	20.58	20.73		20.89	20.97		21	21	2	:1	20.99	20.91	20.67	20.4	45		(87)
Temp	perature	during h	neating	ре	eriods in	rest c	of d	velling	from Ta	able	9, Th	2 (°C)						
(88)m=	20.28	20.29	20.29	T	20.3	20.3		20.31	20.31	20.	.31	20.31	20.3	20.3	20.	29		(88)
Utilisa	ation fac	- ctor for a	ains fo	r re	est of dy	vellina	1. h2	.m (se	e Table	9a)				•	•			
(89)m=	0.99	0.97	0.94	Ť	0.85	0.68		0.47	0.32	0.3	34	0.56	0.84	0.97	0.9	9		(89)
Mean	interna	l temper	ature i		he rest (of dwe	llin	1 T2 (f	nllow sta	ene a		in Tabl	e 9c)					
(90)m=	19.58	19.75	19.96	T	20.18	20.28		20.31	20.31	20.	.31	20.3	20.2	19.89	19.	56		(90)
(· · · / · · ·										L	<u> </u>					-		_ ` ´

 $fLA = Living area \div (4) = 0.62$ (91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

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

				_	_	_			_	_	_	_		
(93)m=	20.13	20.27	20.44	20.62	20.71	20.74	20.74	20.74	20.73	20.64	20.37	20.11		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	ï to the r	mean int	ernal tei	mperatu	re obtair	ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u	tilisation	factor fo	or gains	using Ta	able 9a									
1.1411.4	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilis:		tor for g	ains, nm		0.71	0.51	0.26	0.20	0.50	0.96	0.07	0.00		(94)
		0.97	0.94	0.00 ()m x (9)	()m	0.51	0.30	0.36	0.59	0.00	0.97	0.99		(34)
(95)m=	369.12	399.18	409.03	386.51	321.13	221.14	149.6	156.31	239.02	330.03	352.21	354.9		(95)
Mont	hlv aver	ade exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an interr	al tempe	erature,	Lm , W =	ـــــــــــــــــــــــــــــــــــــ	x [(93)m	L – (96)m]				
(97)m=	597.32	577.86	522.55	432.3	331.25	221.92	149.65	156.39	241.4	369.04	491.21	592.58		(97)
Spac	e 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=	169.78	120.07	84.46	32.97	7.53	0	0	0	0	29.03	100.08	176.83		
								Tota	l per year	(kWh/yea	⁻) = Sum(9	8)15,912 =	720.75	(98)
Spac	e heatin	g require	ement in	kWh/m²	²/year								14.59	(99)
9b. En	erav rec	uiremer	nts – Coi	mmunitv	heating	scheme	ż							
This p	art is use	ed for sp	ace hea	itina. spa	ace cool	ing or wa	ater heat	ina prov	ided by	a comm	unitv scł	neme.		
Fractio	on of spa	ace heat	from se	condary,	/suppler	nentary l	heating (Table 1	1) '0' if n	one			0	(301)
Fraction of space heat from community system $1 - (301) =$												1	(302)	
The con	nmunity so	cheme mag	y obtain he	eat from se	everal sou	rces. The p	orocedure a	allows for	CHP and	up to four	other heat	sources; ti	he latter	-
includes	s boilers, h	eat pumps	s, geotheri	mal and wa	aste heat f	from powe	r stations.	See Appel	ndix C.					
Fractio	on of hea	at from C	ommun	ity heat	pump								1	(303a)
Fractio	on of tota	al space	heat fro	m Comn	nunity he	eat pump	р			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	or commu	inity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for a	commun	ity heati	ng systei	m					1.05	(306)
Space	heating	9											kWh/year	
Annua	l space	heating	requiren	nent									720.75]
Space	heat fro	om Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	756.79	(307a)
Efficie	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	m Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/su	oplemen	itary syst	em	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating	1												
Annua	l water h	neating r	equirem	ent									1813.74]
If DHV Water	V from c heat fro	ommunit m Comn	ty schen nunity he	ne: eat pump	D				(64) x (30	03a) x (30	5) x (306) :	=	1904.42	(310a)
Electri	city used	d for hea	t distrib	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	26.61	(313)
Coolin	g Syster	n Energ	y Efficie	ncy Rati	0								0	(314)
Space	cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
Electri	city for r	oumos ai	nd fans v	within dv	vellina (Table 4f)):							_
mecha	nical ve	ntilation	- balanc	ed, extra	act or po	ositive in	put from	outside					120.51	(330a)

DER WorkSheet: New dwelling design stage

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	120.51	(331)
Energy for lighting (calculated in Appendix L)		241.63	(332)
Electricity generated by PVs (Appendix M) (negative quantit	у)	-285.95	(333)
Total delivered energy for all uses $(307) + (309) + (310) + (310)$	12) + (315) + (331) + (332)(237b) =	2737.41	(338)
12b CO2 Emissions – Community heating scheme			

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water heatin Efficiency of heat source 1 (%)	g (not CHP) ere is CHP using two fuels repeat (363) to (3	366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 345.29	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 13.81	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)		= 359.1	(373)
CO2 associated with space heating (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from immersion heater	or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water heatin	g (373) + (374) + (375) =		359.1	(376)
CO2 associated with electricity for pumps and fans	s within dwelling (331)) x	0.52	= 62.55	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 125.41	(379)
Energy saving/generation technologies (333) to (33 Item 1	34) as applicable).52 × 0.01 =	-148.41	(380)
Total CO2, kg/year sum of (376)(382) =		398.65	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =	:		8.07	(384)
El rating (section 14)			94.34	(385)
Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

1		,		
Approved Docume Printed on 03 Augu	nt L1A, 2013 Edition ust 2022 at 12:29:06	, England assessed by Strom	na FSAP 2012 program, Ver	sion: 1.0.5.16
Project Informatio	n:			
Assessed By:	Robyn Berry (STR	2036659)	Building Type:	Flat
Dwelling Details:				
NEW DWELLING	DESIGN STAGE		Total Floor Area: 6	2.73m ²
Site Reference :	BP Finchley Road		Plot Reference:	205 BP Finchley Rd
Address :	205 BP Finchley R	d, London, NW3 5EY		
Client Details:				
Name: Address :				
This report covers	s items included wi te report of regulati	thin the SAP calculations. ons compliance.		
1a TER and DER	g			
Fuel for main heati	ng system: Electricity	/ (c)		
Fuel factor: 1.55 (e	electricity (c))			
Target Carbon Dio	xide Emission Rate (TER)	24.58 kg/m ²	
Dwelling Carbon D	ioxide Emission Rate	e (DER)	6.61 kg/m ²	ОК
1b TFEE and DFI			$20.4 \text{ k}M/\text{b}/m^2$	
Dwelling Eabric Ener	gy Efficiency (TFEE)	E)	39.4 KWN/M² 30.9 k\//h/m²	
Dweiling Fabrie En		-)	00.0 (((())))	ОК
2 Fabric U-value	S			
Element		Average	Highest	
External v	vall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall		0.00 (max. 0.20)	-	OK
Floor		(no floor)		
Root		(10 root)	1.20 (max - 2.20)	OK
2a Thermal bride	ning	0.90 (IIIax. 2.00)	1.20 (IIIdX. 5.50)	UN
Thermal b	pridging calculated fro	om linear thermal transmittan	ices for each junction	
3 Air permeabilit	v			
Air permeab	pility at 50 pascals		3.00 (design valu	le)
Maximum			10.0	OK
4 Heating efficient	ncy			
Main Heatin	g system:	Community heating scheme	es - Heat pump	
Secondary	posting system:	None		
Secondary	leating system.	NONE		
5 Cylinder insula	ation			
Hot water St	torage:	No cylinder		
6 Controls				
Space heati	ng controls	Charging system linked to u	use of community heating, p	rogrammer and TRVs OK
Hot water co	ontrois:	No cylinder thermostat No cylinder		

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	ОК
MVHR efficiency:	90%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North	7.61m ²	
Windows facing: North West	1.67m ²	
Ventilation rate:	2.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Party Walls U-value	0 W/m²K	

Community heating, heat from electric heat pump

Photovoltaic array

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documer Printed on 03 Augu Project Information	nt L1A, 2013 Edition st 2022 at 12:29:05 n:	, England assessed by Str	oma FSAP 2012 progran	n, Version: 1.0.5.16	
Assessed By:	Robyn Berry (STR	D036659)	Building Typ	be: Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor A	rea: 72.1m ²	
Site Reference :	BP Finchlev Road		Plot Referen	ce: 405 BP Find	hlev Rd
Address :	405 BP Finchlev R	d. London, NW3 5EY			,
Client Details:	, , , , , , , , , , , , , , , , , , ,	-,			
Name:					
Address :					
This report covers It is not a complet	s items included wi e report of regulati	thin the SAP calculation on compliance.	S.		
1a TER and DER					
Fuel for main heatir	ng system: Electricity	/ (C)			
Fuel factor: 1.55 (el	ectricity (c))				
Target Carbon Diox	(Ide Emission Rate (27.5 Kg/m ²		OK
1b TFEE and DFE			7.59 Kg/IIF		UK
Target Fabric Energy	gy Efficiency (TFEE)		53.2 kWh/r	n²	
Dwelling Fabric Ene	ergy Efficiency (DFE	E)	40.6 kWh/r	n²	
					ОК
2 Fabric U-values	5				
Element		Average	Highest		
External w	vall	0.15 (max. 0.30)	0.15 (max. 0.	70)	OK
Party wall		0.00 (max. 0.20)	-		OK
Floor		(10 100r) 0.12 (max 0.20)	0.12 (may 0	35)	OK
Openings		0.94 (max. 2.00)	1.20 (max. 3.	30)	ОК
2a Thermal bridg	ing			,	
Thermal b	ridging calculated fro	om linear thermal transmit	ances for each junction		
3 Air permeability	y				
Air permeab	ility at 50 pascals		3.00 (desig	ın value)	
Maximum			10.0		OK
4 Heating efficier	псу				
Main Heating	g system:	Community heating sche	emes - Heat pump		
Secondary h	eating system:	None			
5 Cylinder insula	tion				
Hot water St	orage:	No cylinder			
6 Controls		-			
Space heatir Hot water co	ng controls ntrols:	Charging system linked t No cylinder thermostat No cylinder	o use of community heat	ing, programmer ar	nd TRVs OK

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North	6.58m ²	
Windows facing: East	6.28m ²	
Ventilation rate:	2.00	
Blinds/curtains:	None	
10 Key features		
Thermal bridging	0.037 W/m²K	
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Roofs U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	

Party Walls U-value Community heating, heat from electric heat pump Photovoltaic array

DER WorkSheet: New dwelling design stage

User Details:										
Assessor Name: Robyn Berry Stroma Number: STRC	036659									
Software Name: Stroma FSAP 2012 Software Version: Version	on: 1.0.5.16									
Property Address: 103 BP Finchley Rd										
Address : 103 BP Finchley Rd, London, NW3 5EY										
1. Overall dwelling dimensions:										
Area(m²)Av. Height(m)Ground floor 49.6 (1a) x 2.54 (2a) =	Volume(m ³) 125.98 (3a)									
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ (49.6 (4)										
Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) =$	125.98 (5)									
2. Ventilation rate:	m3 nor hour									
heating heating	m ³ per nour									
Number of chimneys 0 + 0 + 0 = 0 × 40 =	0 (6a)									
Number of open flues $0 + 0 + 0 = 0 \times 20 =$	0 (6b)									
Number of intermittent fans 0 x 10 =	0 (7a)									
Number of passive vents 0 x 10 =	0 (7b)									
Number of flueless gas fires $0 \times 40 =$	0 (7c)									
Air cl	nanges per hour									
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$	0 (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]x0.1 =	0 (10)									
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0 (11)									
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35										
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0 (12)									
If no draught lobby, enter 0.05, else enter 0	0 (13)									
Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] =$	0 (14)									
$ \begin{array}{l} \text{Infiltration} \\ \text{(8)} + (10) + (11) + (12) + (13) + (15) = \\ \end{array} $	0 (15)									
Air permeability value, g50, expressed in cubic metres per hour per square metre of envelope area	3 (17)									
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.15 (18)									
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used										
Number of sides sheltered	3 (19)									
Shelter factor $(20) = 1 - [0.075 \times (19)] =$	0.78 (20)									
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	0.12 (21)									
Initiation rate modified for monthly wind speed	1									
Monthly overage wind encod from Table 7	J									
wonuny average wind speed from Table 7										
(22)m = 51 + 5 + 49 + 44 + 43 + 38 + 38 + 37 + 4 + 43 + 45 + 47	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]									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $]									

DER WorkSheet: New dwelling design stage

Adjusted infiltration	ate (allow	ving for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.15 0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effective a	ir change	rate for t	he appli	cable ca	se					<u>.</u>	· [
If mechanical ven		ondix N (2	2h) - (22a	\rightarrow Emv (c	austion (N	(5)) otho	nuico (22h) - (220)			0.5	(23a)
If balanced with best r	ip using App		SD = (23a)	a) x FIIIV (e	actor (from	$T_{able} 4b$	1 wise (230) = (23a)			0.5	(23b)
	ecovery. em) =	2 15)	001-)	4 (00-)	76.5	(23c)
	chanical v			at recove		HR) (248	a)m = (22)	2b)m + ()	23b) × [1 - (23c)	÷ 100] I	(242)
	0.20	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(240)
b) If balanced me			without	neat rec		/1V) (240	m = (22)	2b)m + (2 	230)		1	(24b)
	0		0	0		0	0	0	0	0		(240)
c) If whole house if $(22h)m < 0$	extract ve 5 x (23b)	ntilation (then (24)	or positiv 5) = (23b	/e input \	ventilatio	on trom (c) = (22h	$p_{\rm 0}$ m + 0	5 x (23h)			
(24c)m = 0 0			0			0 = (22)			0	0	1	(24c)
d) If natural ventil	tion or wh				ventilatio	n from l	oft	Ů	, , , , , , , , , , , , , , , , , , ,		l	· · ·
if $(22b)m = 1$,	then (24d	m = (22)	b)m othe	erwise (2	(4d)m = 0	0.5 + [(2	2b)m ² x	0.5]				
(24d)m= 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air chang	ge rate - e	nter (24a) or (24t	o) or (24	c) or (24	d) in bo>	(25)					
(25)m= 0.27 0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
2 Heat losses and	hoot loop	poromot	ori								1	
ELEMENT G		Onenin	ฮเ. ดร	Not Ar	62	l I-valı		ΔΧΠ		k-value	2	AXk
ar	ea (m²)	m	93 ²	A ,n	n²	W/m2	K	(W/I	K)	kJ/m ² ·l	K	kJ/K
Doors				2.1	x	1.2	=	2.52				(26)
Windows Type 1				6.649) x1/	/[1/(0.9)+	0.04] =	5.78				(27)
Windows Type 2				3.035	; x1/	/[1/(0.9)+	0.04] =	2.64	=			(27)
Walls Type1	7.26	9.68		17.58	3 X	0.15		2.64	= r			(29)
Walls Type2	0.05	2.1		17.95		0.14		2.54			\dashv	(29)
Total area of elemer	nts. m ²			47 31		••••	I		L		L	(31)
Party wall	,			20.85		0		0				(32)
Party floor				40.6		0	[0	L [\dashv	
Party coiling				49.0					L		\dashv	
* for windows and roof w	ndows uso	offoctivo wi	ndowlly	49.6		formula 1	/[/1/11/04	(a) = 0.041 c	l s aivon in	paragraph		(320)
** include the areas on b	oth sides of i	internal wal	ls and part	titions	aleu using	Tornula I	/[(1/0-vaic	ie/+0.0+j a	is given in	paragrapi	1 3.2	
Fabric heat loss, W/	K = S (A ×	(U)				(26)(30)) + (32) =				16.11	(33)
Heat capacity Cm =	S(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	6947.17	(34)
Thermal mass parar	neter (TM	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assessments	where the d	etails of the	construct	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
can be used instead of a	detailed cal	culation.			,							
Thermal bridges : S	(L x Y) ca	lculated (pendix ł	Κ						4.97	(36)
Total fabric heat los	ng are not k S	nown (36) =	= 0.05 x (3	1)			(33) +	(36) =			21.09	(37)
Ventilation heat loss	calculate	d monthly	1				(38)m	$= 0.33 \times ($	25)m x (5))	21.00	(37)
	h Mar	Anr	May	Jun	Jul	Διια	Sen			, Dec]	
(38)m= 11.05 10.9	3 10.81	10.2	10.08	9.48	9.48	9.36	9.72	10.08	10.32	10.56		(38)
		···-=					(20)~	_ (27) _ (28)m		1	
$(39)_{m} = 32.12$		21 22	31 16	30 55	30 55	30 / 3	(59)M 30 8	= (37) + (, 31 16	30/11	31.64		
Stromp ESAD 0040 V/202	00: 105 40		b#n://		00.00	50.45	30.0	Average -	Sum(39).	12 /12=	31.25 -	
Subina FSAF 2012 Vers	01. 1.0.5.16	(SAP 9.92)	- mp://w	ww.suoma	.com						v∸Pa	<u>ye ∠ ψ 7~'</u>

DER WorkSheet: New dwelling design stage

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	0.65	0.65	0.64	0.63	0.63	0.62	0.62	0.61	0.62	0.63	0.63	0.64		
Numbe	er of dav	rs in mo	nth (Tab	le 1a)			-		/	Average =	Sum(40)1.	12 /12=	0.63	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
I													1	
4. Wa	ter heat	ing ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1]	(42)
Annual Reduce	averag the annua	e hot wa al average	ater usag hot water	ge in litre usage by a	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed t	(25 x N) to achieve	+ 36 a water us	se target o	74 f	.06]	(43)
					Max			A	Can	Oct	Nov	Dee]	
Hot wate	Jan er usage ir	n litres per	day for ea	Apr ach month	Vd.m = fa	ctor from T	Jui Table 1c x	Aug (43)	Sep	Oct	INOV	Dec		
(44)m-	81 47	78.5	75 54	72 58	69.62	66 65	66 65	69.62	72 58	75 54	78 5	81 47]	
(++)///-	01.47	70.0	70.04	12.00	00.02	00.00	00.00	00.02	12.00	Fotal = Su	m(44)1_12 =	01.47	888.72	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D)Tm / 3600) kWh/mon	th (see Ta	ables 1b, 1	c, 1d)		
(45)m=	120.81	105.66	109.03	95.06	91.21	78.71	72.93	83.69	84.69	98.7	107.74	117		
										Fotal = Su	m(45) ₁₁₂ =		1165.25	(45)
lf instant	aneous w	ater heati	ng at point	t of use (no	hot water	r storage),	enter 0 in	boxes (46)) to (61)				1	
(46)m= Water	18.12 storage	15.85 1055	16.36	14.26	13.68	11.81	10.94	12.55	12.7	14.81	16.16	17.55		(46)
Storage	e volum	e (litres)	includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0]	(47)
lf comr	nunity h	eating a	ind no ta	ank in dw	velling, e	nter 110	litres in	(47)					l	
Otherw	ise if no	stored	hot wate	er (this ir	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:				<i></i>	<i>.</i>						1	
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kvvr	n/day):					0		(48)
Tempe	rature fa	actor fro	m I able	20				(10) (10)				0		(49)
Energy b) If m	lost fro	m water urer's de	storage	e, KVVh/ye cylinder l	ear Ioss fact	or is not	known.	(48) x (49)) =		1'	10		(50)
Hot wa	ter stora	age loss	factor fr	rom Tabl	e 2 (kW	h/litre/da	iy)				0.	02		(51)
If comr	nunity h	eating s	ee secti	on 4.3										
Volume	e factor	from Ta	ble 2a	0							1.	03		(52)
lempe	rature fa	actor fro	m I able	2b							0	.6		(53)
Energy	lost fro	m water	storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Wotor			oulotod i	for agab	month			((EG)m - (EE) v (44);	~	1.	03		(55)
vvaler	sionage	1055 Cal						((50)11 = (55) x (41)i				1	(50)
(56)m=	32.01	28.92	32.01	30.98	32.01 m = (56)m	30.98	32.01	32.01	30.98	32.01	30.98	32.01	liv H	(56)
				lage, (<i>37)</i>	n = (50)m	× [(50) – ([] [/)iii = (30)				1	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal		for each	month (59)m = ((58) ÷ 36	65 × (41)	m Novinato:	thorno -	etet)			
(11100 (59)m-		21 01	23.26		23.26	22 51		19 anu a	22.51	23.26	22 51	22.26		(59)
(00)11-	20.20	21.01	20.20		20.20	22.01	20.20	20.20	22.01	20.20	22.01	20.20	l	(00)

Combi	loss ca	alculated	for eac	ch i	month (61)m =	(60)) ÷ 30	65 × (41))m									
(61)m=	0	0	0		0	0		0	0	0)	0	0		0	(0		(61)
Total h	eat rec	uired for	water	he	ating ca	alculated	d fo	r eac	h month	(62)	m =	0.85 × ((45)m	+ (4	46)m +	(57)	m +	(59)m + (61)m	
(62)m=	176.09	155.59	164.31		148.55	146.49	1	32.2	128.21	138	.97	138.19	153.9	8	161.23	172	2.28		(62)
Solar DI	-IW input	calculated	using Ap	ppe	ndix G or	Appendi	κΗ	(negati	ve quantity	/) (ent	er '0'	' if no sola	r contrit	butio	n to wate	er hea	ating)		
(add a	dditiona	al lines if	FGHR	S 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	(0		(63)
Output	from v	vater hea	ter										-						
(64)m=	176.09	155.59	164.31		148.55	146.49	1	32.2	128.21	138	.97	138.19	153.9	8	161.23	172	2.28		
			•				•				Outp	out from w	ater hea	ater	(annual)₁	12		1816.09	(64)
Heat g	ains fro	om water	heatin	g, I	kWh/m	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	k [(46)	m +	· (57)m	+ (5	59)m]	
(65)m=	84.39	75.07	80.48	Τ	74.4	74.55	6	8.97	68.47	72.	05	70.96	77.04	4	78.62	83	.12		(65)
inclu	ide (57))m in calo	ulatior	י וס ו	f (65)m	only if c	yliı	nder i	s in the c	dwell	ing	or hot w	ater is	s fro	m com	mun	nity h	eating	
5. Internal gains (see Table 5 and 5a):																			
Metab	olic gai	ns (Table	5) W	atte	S														
motab	Jan	Feb	Mar	- T	Apr	May	Γ	Jun	Jul	Α	ug	Sep	Oc	t	Nov	C)ec		
(66)m=	83.92	83.92	83.92	╈	83.92	83.92	6	33.92	83.92	83.	92	83.92	83.92	2	83.92	83	.92		(66)
Liahtin	a aains	(calcula	ted in <i>I</i>		pendix	L. equat	ion	L9 o	r L9a). a	lso s	ee ⁻	Table 5	1					I	
(67)m=	13.16	11.69	9.51	Ť	7.2	5.38		4.54	4.91	6.3	88	8.56	10.8	7	12.69	13	.53		(67)
Applia	nces da	ains (calc	ulated	in	Append	lix L. eo	uat	tion L	13 or L1	3a).	also	see Ta	ble 5						
(68)m=	146.19	147.71	143.89		135.75	125.48	1	15.82	109.37	107	.85	111.68	119.8	31	130.09	139	9.74		(68)
Cookir		s (calcula	L ated in	 An	nendix	l equa	L tior	1 I 15	or L 15a)	als	0.56	e Table	5						
(69)m=	31.39	31.39	31.39	Ţ	31.39	31.39		31.39	31.39	31.	39	31.39	31.39	9	31.39	31	.39		(69)
Pumps	L	I Ins dains	I (Table	52	a)		I												
(70)m=				T	0	0	Γ	0	0	0)	0	0		0		0		(70)
		Vanoratio	n (nea	ativ	ve valu	es) (Tab		5)	-						-		-		
(71)m=	-67.13	-67.13	-67.13		-67.13	-67.13		57.13	-67.13	-67	13	-67.13	-67.1	3	-67.13	-67	7.13		(71)
Water	heating		Table 5		00					•				<u> </u>					
(72)m=	113 43	111 72	108 17	, ,	103 34	100.2		95 79	92.03	96	84	98 55	103.5	5	109 19	111	1 73		(72)
Total i	ntorna				100.01	100.2		(66)	m + (67)m	+ (68	3)m 4	(69)m + ((70)m +	. (71)	m + (72)				(/
(73)m-	320.96	310.20	309.72		294.46	279.23	2	64 32	254.48	250	25	266.96	282.4	(л.). ц	300 14	312	3 17	l	(73)
(10)III-	lar gain	010.20	000.70	<u></u>	234.40	213.23	2	04.52	234.40	200	.20	200.00	202.4	<u> </u>	300.14				(10)
Solar o	ains are	calculated	using so	lar	flux from	Table 6a	and	assoc	iated equa	tions	to co	onvert to th	ne applio	cable	e orientat	tion.			
Orienta	ation:	Access F	actor		Area			Flu	ıx '			q			FF			Gains	
		Table 6d			m²			Ta	ble 6a		Т	able 6b		Та	ble 6c			(W)	
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	3	36.79	x		0.35	×		0.8		=	21.67	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	6	62.67	x		0.35	× ٦		0.8		=	36.91	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	6	35.75	x		0.35	۲ ×		0.8		=	50.5	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	06.25	x		0.35	۲×		0.8		=	62.57	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	19.01	x		0.35	۲ ×	\vdash	0.8		=	70.09](77)
		5.17			0.0			'		I					0.0				∟` ′

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	18.15	×	(0.35	×	0.8		=	69.58	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	13.91	×	(0.35	×	0.8		=	67.08	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	1	04.39	x	(0.35	×	0.8		= [61.48	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	9	2.85	x	(0.35	×	0.8		= [54.68	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	6	9.27	×	(0.35	_ x [0.8		= [40.79	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	4	4.07	x	(0.35	_ x [0.8		= [25.95	(77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0	4	x	3	31.49	×	(0.35	_ x [0.8		= [18.54	(77)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	3	86.79]	(0.35	×	0.8		= [47.47	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	6	62.67		(0.35	×	0.8		=	80.86	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	8	35.75]	(0.35	×	0.8		=	110.64	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	06.25]	(0.35	×	0.8		= [137.08	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	19.01]	(0.35	×	0.8		= [153.54	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	18.15]	(0.35	x	0.8		=	152.43	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	13.91]	(0.35	×	0.8		= [146.96	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	1	04.39]	(0.35	×	0.8		= [134.68	(79)
Southw	/est <mark>0.9x</mark>	0.77		x	6.6	5	x	9	92.85]	(0.35	×	0.8		=	119.79	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	6	9.27]	(0.35	×	0.8		= [89.37	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	4	4.07		(0.35	×	0.8		=	56.86	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	6.6	5	x	3	31.49]	(0.35	x	0.8		=	40.62	(79)
	-									-						-		
Solar (gains in	watts, ca	alcula	ated	for eacl	n month	-			(83)m	n = Sun	n(74)m .	(82)m					
(83)m=	69.14	117.77	161.	14	199.66	223.63	2	22.01	214.04	196	5.16 ·	174.48	130.16	82.81	59.1	7		(83)
Total g	gains – i	internal a	and so	olar	(84)m =	: (73)m	+ (83)m	, watts					-				
(84)m=	390.09	437.06	470.	87	494.11	502.86	4	86.33	468.53	455	5.4	441.44	412.57	382.95	372.3	34		(84)
7. Me	ean inte	rnal temp	peratu	ure (heating	season)											
Temp	perature	during h	neatin	ig pe	eriods ir	the livi	ng	area	from Tab	ole 9	, Th1	(°C)					21	(85)
Utilis	ation fac	ctor for g	ains f	for li	ving are	ea, h1,m	ı (s	ee Ta	ble 9a)						-			-
	Jan	Feb	Ma	ar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	De	C		
(86)m=	0.98	0.95	0.8	8	0.74	0.57		0.4	0.29	0.3	31	0.48	0.76	0.94	0.98	}		(86)
Mear	n interna	al temper	ature	in li	iving are	ea T1 (fe	ollo	w ste	ps 3 to 7	7 in T	able	9c)						
(87)m=	20.68	20.79	20.	9	20.98	21		21	21	2	1	21	20.98	20.84	20.6	5		(87)
Temp	berature	during h	neatin	ig pe	eriods ir	rest of	dw	elling	from Ta	able 9	9, Th2	2 (°C)			-			
(88)m=	20.39	20.39	20.3	39	20.4	20.4	2	20.42	20.42	20.	42	20.41	20.4	20.4	20.4	t		(88)
Utilis	ation fac	ctor for a	ains f	for r	est of d	vellina	h2	m (se	e Table	9a)				•				
(89)m=	0.97	0.94	0.8	6	0.71	0.54		0.37	0.25	0.2	27	0.44	0.72	0.93	0.98	3		(89)
Mean		l temper	ature	in t	he rest	of dwall	ina	T2 /f	ullow etc	, 1 1	to 7	in Tabl		!	1			
(90)m=	19.97	20.13	20.2	28	20.38	20.4	2	20.42	20.42	20.	42	20.41	20.38	20.21	19.94	4		(90)
				[-		<u> </u>		I			f	LA = Livi	ng area ÷ (4	4) =	\dashv	0.62	(91)
																L 1		_` <u>`</u>

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

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

(93)m=	20.41	20.54	20.66	20.75	20.77	20.78	20.78	20.78	20.78	20.75	20.6	20.38		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the r	nean int	ernal ter	mperatu	re obtair	ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
uie ui	Jan	Feb	Mar	Anr	May	Jun	Jul	Aug	Sen	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm):	Iviay		Uui	nug		000	1107	000		
(94)m=	0.97	0.94	0.87	0.73	0.56	0.39	0.27	0.29	0.47	0.75	0.93	0.98		(94)
Usefu	ul gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m=	379.7	411.35	410.51	361.63	281.62	188.7	127.63	133.23	205.39	307.6	356.96	364.62		(95)
Mont	hly avera	age exte	rnal tem	perature	e from Ta	able 8			r	r				
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al tempe	erature,	Lm , W :	=[(39)m	x [(93)m	– (96)m]	400.0			(07)
(97)m=	517.44	500.48	451.62	370.66	282.62	188.74	127.63	133.24	205.56	316.31	423.9	512.08		(97)
Space		g require			1000000000000000000000000000000000000	wn/mon	$\ln = 0.02$	24 X [(97])m – (95 I)mj x (4	1)m	100.71		
(90)11=	102.40	09.9	30.30	0.01	0.74	0	0	Toto		0.40	40.19	0)	264 50	
•					.,			TULA	i per year	(KVVII/yeal) = Sum(9	O)15,912 =	504.59	
Space	e heatin	g require	ement in	kWh/m ²	/year								7.35	(99)
9b. En	ergy rec	luiremer	its – Cor	mmunity	heating	scheme	;							
This pa	art is use	ed for sp	ace hea	iting, spa	ace cool	ing or wa	ater hea	ting prov (Table 1.'	rided by 1) '0' if n	a comm	unity scł	neme.	0	(301)
Fraction of space neat from secondary/supplementary heating (Table 11) '0' if none												0		
Fractic	on of spa	ace heat	from co	mmunity	' system	1 – (30	1) =						1	(302)
The con	nmunity so boilers h	heme may	/ obtain he	eat from se	everal soul	rces. The j from nowe	procedure	allows for	CHP and i ndix C	up to four	other heat	sources; tl	he latter	
Fractic	on of hea	at from C	commun	ity heat	pump	ioni powe	Stations.		IUX O.				1	(303a)
Fractic	on of tota	al space	heat fro	m Comn	nunity he	eat pum	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	I2c) for a	commun	ity heati	ng syste	m					1.05	(306)
Space	heating	a										Ī	kWh/yea	 •
Annua	l space	heating	requiren	nent									364.59	7
Space	heat fro	m Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306)	=	382.82	(307a)
Efficie	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	requirer	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating	I												_
Annua	l water h	neating r	equirem	ent									1816.09	
If DHV Water	V from co heat fro	ommunit m Comn	y schem nunity he	ne: eat pump	C				(64) x (30	03a) x (30	5) x (306) :	-	1906.89	(310a)
Electri	city used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	22.9	(313)
Cooling System Energy Efficiency Ratio													0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0) $= (107) \div (314) =$												ĺ	0	(315)
Flectri	city for n	oumps ai	nd fans v	within dv	velling (Table 4f)	:							_

DER WorkSheet: New dwelling design stage

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	121.04	(331)
Energy for lighting (calculated in Appendix L)		232.42	(332)
Electricity generated by PVs (Appendix M) (negative quantity)	-285.95	(333)
Total delivered energy for all uses $(307) + (309) + (310) + (310)$	2) + (315) + (331) + (332)(237b) =	2357.21	(338)
12b. CO2 Emissions – Community heating scheme			

	Energy kWh/year	Emission factor kg CO2/kWh	[·] Emissions kg CO2/year	
CO2 from other sources of space and water heating (n Efficiency of heat source 1 (%)	ot CHP) s CHP using two fuels repeat (363) to (366) for the second fu	iel 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 297.09	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 11.88	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	= 308.97	(373)
CO2 associated with space heating (secondary)	(309) x	0	= 0	(374)
CO2 associated with water from immersion heater or ir	nstantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =		308.97	(376)
CO2 associated with electricity for pumps and fans with	hin dwelling (331)) x	0.52	= 62.82	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 120.62	(379)
Energy saving/generation technologies (333) to (334) a Item 1	as applicable	0.52 × 0.01 =	-148.41	(380)
Total CO2, kg/year sum of (376)(38	82) =		344.01	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			6.94	(384)
El rating (section 14)			95.13	(385)

DER WorkSheet: New dwelling design stage

Assessor Name: Robyn Berry Stroma Number: STR0036659 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.16 Property Address: 205 BP Finchley Rd, London, NW3 5EY Version: Version: Address : 205 BP Finchley Rd, London, NW3 5EY Version: Volume(m³) Crownd floor Volume(m³) Volume(m³) Volume(m³)
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.16 Property Address: 205 BP Finchley Rd, London, NW3 5EY Version: Version: 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³)
Property Address: 205 BP Finchley Rd Address : 205 BP Finchley Rd, London, NW3 5EY 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³) Cround floor Volume(m³) Volume(m³)
Address : 205 BP Finchley Rd, London, NW3 5EY 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³) Cround floor Image: Cround floor Image: Cround floor Image: Cround floor Image: Cround floor
1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³)
Area(m ²) Av. Height(m) Volume(m ³)
62.73 (1a) x 2.54 (2a) = 159.34 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 62.73 (4)
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 159.34$ (5)
2. Ventilation rate:
heating heating total m ³ per hour
Number of chimneys $0 + 0 + 0 = 0 $ x 40 = 0 (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$ (6b)
Number of intermittent fans
Number of passive vents $0 \times 10 = 0$ (7b)
Number of flueless gas fires $0 \times 40 = 0 (7c)$
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)
Additional infiltration (9)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped 0 (14)
$0.23 = [0.2 \times (14) \div 100] = 0 $ (15) (15) (16) (16) (16) (16) (16) (16) (16) (16
Air permeability value $a50$ expressed in cubic metres per hour per square metre of envelope area 2 (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.12$ (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

DER WorkSheet: New dwelling design stage

0.15 0.14 0.13 0.12 0.11 0.11 0.11 0.12 0.12 0.13 0.14 Calculate effective air change rate for the applicable caseIf mechanical ventilation:0.5(23)If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a) 0.5 (23) If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a) 0.5 (23) If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23b) $(1 - (23c) \div 100]$ (24a)m= 0.27 0.26 0.25 0.24 0.23 0.23 0.23 0.24 0.25 0.25 (24) b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)(24b)m= 0 0 0 0 0 0 0 0 0 0 0 (24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 (24c)m= $(22b)m < 0.5 × (23b)$ (24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 (24c)m= 0 0 0 0 0 0 0 0 0 0 0 (24b	
Calculate effective air change rate for the applicable caseIf mechanical ventilation:0.5(23a) × Fmv (equation (N5)), otherwise (23b) = (23a)If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100](24a)m= 0.27 0.260.250.270.260.25000000000000000000000000000000000 <td colspa="</td"></td>	
If the characteristical ventilation. If exhaust air heat pump using Appendix N, $(23b) = (23a) \times Fmv$ (equation (N5)), otherwise $(23b) = (23a)$ If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = $(22b)m + (23b) \times [1 - (23c) \div 100]$ (24a)m= 0.27 0.26 0.26 0.25 0.24 0.23 0.23 0.23 0.23 0.24 0.25 0.25 (24ib) b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = $(22b)m + (23b)$ (24b)m= 0 0 0 0 0 0 0 0 0 0	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × $[1 - (23c) \div 100]$ (24a)m= 0.27 0.26 0.26 0.25 0.24 0.23 0.23 0.23 0.23 0.23 0.24 0.25 0.25 (24i) b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
a) If balanced mechanical ventilation with heat recovery (MVHR) $(24a)m = (22b)m + (23b) \times [1 - (23c) \div 100]$ (24a)m = 0.27 0.26 0.26 0.25 0.24 0.23 0.23 0.23 0.23 0.24 0.25 0.25 (24a)m = 0 0 0 0 0 0 0 0 0 0	
(24a)m= 0.27 0.26 0.25 0.24 0.23 0.23 0.23 0.24 0.25 0.25 (24a)m= (24a)m= 0.27 0.26 0.25 0.24 0.23 0.23 0.24 0.25 0.25 0.25 (24a)m= 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.24 0.25 0.25 0.25 0.24 0.25 0.25 0.24 0.25 0.25	
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m = 0 0 0 0 0 0 0 0 0 0	
(24b)m = 0 0 0 0 0 0 0 0 0 0	
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b) m + 0.5 \times (23b)$ (24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
d) If natural ventilation or whole house positive input ventilation from loft if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$ (24d)m = 0 0 0 0 0 0 0 0 0 0	
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m2 x 0.5] $(24d)m = 0 0 0 0 0 0 0 0 0 0$	
(24d)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
3. Heat losses and heat loss parameter:	
ELEMENTGross area (m²)Openings m²Net Area A ,m²U-value W/m2KA X U (W/K)k-value kJ/m²·KA X k kJ/K	
Doors $2.1 \times 1.2 = 2.52$ (26)	
Windows Type 1 $7.613 \times 1/[1/(0.9) + 0.04] = 6.61$ (27)	
Windows Type 2 $1.667 \times 1/[1/(0.9) + 0.04] = 1.45$ (27)	
Walls Type1 34.58 9.28 25.3 x 0.15 = 3.8 (29)	
Walls Type2 21 48 21 19.38 x 0.14 = 2.74 (29)	
Total area of elements. m^2 56.06 (31)	
Party wall $37.5 \times 0 = 0$	
Party floor 62.73	
Party ceiling	
* for windows and roof windows, use effective window U-value calculated using formula 1/(1/U-value)+0.04] as given in paragraph 3.2	
** include the areas on both sides of internal walls and partitions	
Fabric heat loss, $W/K = S (A \times U)$ (26)(30) + (32) =17.12(33)	
Heat capacity $Cm = S(A \times k)$ ((28)(30) + (32) + (32a)(32e) = 8759.51 (34)	
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m²KIndicative Value: Medium250(35)	
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.	
Thermal bridges : S (L x Y) calculated using Appendix K 5.62 (36)	
if details of thermal bridging are not known (36) = $0.05 \times (31)$	
Ventilation heat loss calculated monthly $(30) = 0.22 \times (25) \times \times (5)$	
(38)m= 13.97 13.82 13.67 12.9 12.75 11.99 11.99 11.83 12.29 12.75 13.06 13.36 (38)	
$(39)m = \begin{bmatrix} 36 72 \\ 36 56 \\ 36 41 \\ 35 65 \\ 35 49 \\ 34 73 \\ 34 73 \\ 34 73 \\ 34 58 \\ 35 03 \\ 35 49 \\ 35 49 \\ 35 8 \\ 36 1 \end{bmatrix}$	
Stroma FSAP 2012 Version: 1.0.5.16 (SAP 9.92) - http://www.stroma.com Average = Sum(39)	

DER WorkSheet: New dwelling design stage

Heat lo	ss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	0.59	0.58	0.58	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		
Numbe	r of dav	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40)1.	12 /12=	0.57	(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													1	
4. Wa	ter heat	ing enei	gy requ	irement:								kWh/ye	ear:	
Assum if TF/ if TF/	ed occu A > 13.9 A £ 13.9	pancy, I), N = 1), N = 1	N + 1.76 x	: [1 - exp	(-0.0003	849 x (TF	FA -13.9))2)] + 0.0	0013 x (⁻	ΓFA -13.	2. 9)	06]	(42)
Annual Reduce t not more	average he annua that 125	e hot wa I average litres per p	ater usag hot water person pel	ge in litre usage by s r day (all w	es per da 5% if the a vater use, I	ay Vd,av Iwelling is hot and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us	se target o	83 f	.07]	(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Αυσ	Sen	Oct	Nov	Dec		
L Hot wate	r usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)	Ocp	001	1101	000		
(44)m=	91.38	88.06	84.73	81.41	78.09	74.76	74.76	78.09	81.41	84.73	88.06	91.38		
, , L									-	Fotal = Su	m(44) ₁₁₂ =		996.85	(44)
Energy c	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D	0Tm / 3600) kWh/mor	th (see Ta	ables 1b, 1	c, 1d)		
(45)m=	135.51	118.52	122.3	106.62	102.31	88.29	81.81	93.88	95	110.71	120.85	131.24		
lf instanta	aneous w	ater heatii	na at point	t of use (no	o hot water	^r storaɑe).	enter 0 in	boxes (46	-) to (61)	Fotal = Su	m(45) ₁₁₂ =		1307.03	(45)
(46)m-	20.33	17 78	18 35	15.99	15 35	13.24	12 27	14.08	14.25	16.61	18 13	19.69		(46)
Water s	storage	loss:	10.00	10.00	10.00	10.24	12.21	14.00	14.20	10.01	10.10	10.00		(10)
Storage	e volum	e (litres)	includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel	(0		(47)
If comn	nunity h	eating a	nd no ta	ank in dw	velling, e	nter 110	litres in	(47)					-	
Otherw	ise if no	stored	hot wate	er (this ir	icludes i	nstantar	ieous co	mbi boil	ers) ente	er '0' in (47)			
Water s	storage	lOSS: urer's de	clared I	oss facti	or is kno	wn (k\//k	v(dav).					0	1	(49)
Tompo	raturo fa	actor fro	m Tahla	25 1201			i/uay).					0		(40)
Energy	lost fro	m water	storade	× k\//h/v	əar			(48) x (49)) –			10		(49)
b) If m	anufacti	urer's de	eclared of	cylinder l	loss fact	or is not	known:	(40) X (40)	, –		I	10		(30)
Hot wa	ter stora	age loss	factor fr	rom Tabl	e 2 (kW	h/litre/da	ıy)				0.	02		(51)
If comn	nunity h	eating s	ee secti	on 4.3									1	
Volume	e factor i	rom Tal	ole 2a m Tablo	2h							1.	03		(52)
From								(47) × (51)	V (E2) V (- (5	0.	.6		(53)
Energy Enter (50) or (54) in <i>(</i> 5	storage	e, Kvvn/ye	al			(47) X (31)) X (52) X (55) =	1.	03		(54)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	n		00	l	(00)
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01]	(56)
lf cylinde	r contains	dedicate	d solar sto	prage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (57	7)m = (56)	m where (H11) is fro	m Append] lix H	()
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary	/ circuit	loss (an	nual) fro	om Table	• 3							0		(58)
Primary	/ circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				ı	
(mod	ified by	factor fi	om Tab	le H5 if t	here is s	solar wat	er heatir	ng and a	cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	alculated	for eac	ch i	month (61)m =	(60)) ÷ 36	65 × (41))m								
(61)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(61)
Total h	eat rec	uired for	water	he	ating ca	alculate	d fo	r eac	h month	(62)	m =	0.85 × ((45)m	+ (46)m ·	+ (5	57)m +	(59)m + (61)m	
(62)m=	190.79	168.45	177.58	3	160.12	157.59	1	41.78	137.09	149	.15	148.49	165.9	9 174.34	1 1	186.51		(62)
Solar DH	HW input	calculated	using Ap	ope	ndix G or	Appendi	хH	(negati	ve quantity	/) (ent	er '0'	' if no sola	r contrib	ution to wa	ater h	heating)		
(add a	ddition	al lines if	FGHR	Sa	and/or V	VWHR	S ap	plies	, see Ap	penc	dix G	G)	-					
(63)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(63)
Output	from v	vater hea	ter															
(64)m=	190.79	168.45	177.58	3	160.12	157.59	1	41.78	137.09	149	.15	148.49	165.9	9 174.34	1 1	186.51		_
											Outp	out from wa	ater hea	ter (annual	I) ₁₁₂	!	1957.87	(64)
Heat g	ains fro	om water	heatin	g, I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	51)m	n] + 0.8 >	(46)ı	m + (57)r	m +	(59)m]	
(65)m=	89.28	79.35	84.89		78.25	78.24	7	2.15	71.42	75.	44	74.38	81.03	82.98	1	87.86		(65)
inclu	de (57)m in calo	culatior	n of	f (65)m	only if a	cylii	nder i	s in the c	dwell	ing	or hot w	ater is	from cor	mm	unity h	eating	
5. Int	ernal g	ains (see	e Table	5	and 5a)):												
Metabo	olic gai	ns (Table	e 5), Wa	atts	5													
	Jan	Feb	Mar	·	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	/	Dec		
(66)m=	102.89	102.89	102.89)	102.89	102.89	1	02.89	102.89	102	.89	102.89	102.8	9 102.89	9 1	102.89		(66)
Lightin	g gains	s (calcula	ted in <i>i</i>	٩p	pendix l	L, equa	tion	L9 o	r L9a), a	lso s	ee T	Table 5		•	•			
(67)m=	16.99	15.09	12.27	T	9.29	6.95		5.86	6.34	8.2	24	11.05	14.04	16.38		17.46		(67)
Appliar	nces ga	ains (calc	ulated	in	Append	dix L, ec	luat	tion L	13 or L1	3a), i	also	see Ta	ble 5		ł			
(68)m=	179.78	181.65	176.95	5	166.94	154.3	1	42.43	134.5	132	.63	137.33	147.3	4 159.97	7 1	171.85		(68)
Cookin	ig gain	s (calcula	ted in	Ap	pendix	L, equa	tior	n L15	or L15a)	, als	o se	e Table	5	I				
(69)m=	33.29	33.29	33.29	Ť	33.29	33.29	3	3.29	33.29	33.	29	33.29	33.29	33.29		33.29		(69)
Pumps	and fa	ans gains	(Table	9 5a	a)		-											
(70)m=	0	0	0	Т	0	0		0	0	0)	0	0	0		0		(70)
Losses	se.q.e	vaporatic	n (neg	ati	ve valu	es) (Tal	ble	5)										
(71)m=	-82.31	-82.31	-82.31		-82.31	-82.31		, 32.31	-82.31	-82	.31	-82.31	-82.3	1 -82.31	-	-82.31		(71)
Water	heating	g gains (T	able 5)			1											
(72)m=	120	118.08	114.09	ý 9	108.68	105.16	1	00.21	96	101	.39	103.31	108.9	2 115.25	5 1	118.09		(72)
Total i	nterna	l gains =	I	-			1	(66))m + (67)m	ı + (68	3)m +	- (69)m + ((70)m +	(71)m + (7	'2)m			
(73)m=	370.64	368.68	357.18	3	338.77	320.28	3	02.37	290.7	296	.13	305.56	324.1	6 345.47	7 3	361.27		(73)
6. Sol	lar gair	ns:					1											
Solar g	ains are	calculated	using so	lar	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e applic	able orient	atior	า.		
Orienta	ation:	Access F	actor		Area			Flu	IX			g_		FF			Gains	
		Table 6d			m²			Tal	ble 6a		Т	able 6b		Table 60)		(W)	
North	0.9x	0.77		x	7.6	51	x	1	0.63	x		0.35	x	0.8		=	15.71	(74)
North	0.9x	0.77		x	7.6	51	x	2	20.32	x		0.35	x	0.8		_ = [30.02	(74)
North	0.9x	0.77		x	7.6	51	x	3	34.53	x		0.35	×	0.8] = [51.01	(74)
North	0.9x	0.77		x	7.6	51	x	5	55.46	x		0.35	x	0.8		_ = [81.93	(74)
North	0.9x	0.77		x	7.6	51	x	7	4.72	x		0.35	x	0.8		_ = [110.37	(74)

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

North	0.9x	0.77	:	x	7.6	51	x	7	79.99	x		0.35	x	0.8		=	118.16	(74)
North	0.9x	0.77		x	7.6	51	x	7	74.68	×		0.35	×	0.8		=	110.31	(74)
North	0.9x	0.77	:	x	7.6	51	x	5	59.25	x		0.35	×	0.8		=	87.52	(74)
North	0.9x	0.77	:	x	7.6	51	x	4	1.52	×		0.35	×	0.8		=	61.33	(74)
North	0.9x	0.77	:	x	7.6	51	x	2	24.19	x		0.35	×	0.8		=	35.73	(74)
North	0.9x	0.77	:	x	7.6	51	x	1	3.12	x		0.35	x	0.8		=	19.38	(74)
North	0.9x	0.77	:	x	7.6	51	x		8.86	x		0.35	x	0.8		=	13.09	(74)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	1	1.28	x		0.35	×	0.8		=	3.65	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	2	22.97	x		0.35	x	0.8		=	7.43	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	4	11.38	x		0.35	x	0.8		=	13.38	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	6	67.96	x		0.35	×	0.8		=	21.98	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	g	91.35	x		0.35	x	0.8		=	29.55	(81)
Northwe	est <mark>0.9</mark> x	0.77	:	x	1.6	57	x	g	97.38	x		0.35	x	0.8		=	31.5	(81)
Northwe	est <mark>0.9</mark> x	0.77	:	x	1.6	57	x		91.1	x		0.35	x	0.8		=	29.47	(81)
Northwe	est <mark>0.9</mark> x	0.77	:	x	1.6	57	x	7	72.63	x		0.35	×	0.8		=	23.49	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	5	50.42	×		0.35	×	0.8		=	16.31	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x	2	28.07	x		0.35	x	0.8		=	9.08	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x		14.2	x		0.35	x	0.8		=	4.59	(81)
Northwe	est <mark>0.9x</mark>	0.77	:	x	1.6	57	x		9.21	×		0.35	×	0.8		=	2.98	(81)
Solar g	ains in	watts, ca	alculate	ed	for eac	n mont	<u>h</u>			(83)m	n = Sur	m(74)m .	(82)m					
(83)m=	19.36	37.45	64.39		103.91	139.92	2	149.66	139.78	111	.01	77.64	44.81	23.97	16	.08		(83)
Total g	ains – i	nternal a	and sola	ar	(84)m =	= (73)m	1+((83)m	, watts						_			
(84)m=	390	406.13	421.57		442.69	460.19) 4	452.02	430.48	407	.14	383.2	368.9	7 369.44	377	7.34		(84)
7. Me	an intei	rnal temp	perature	э (heating	seaso	n)											
Temp	erature	during h	neating	pe	eriods ir	n the liv	/ing	area	from Tab	ole 9	, Th1	(°C)					21	(85)
Utilisa	ation fac	ctor for g	ains foi	r lir	ving are	ea, h1,	m (s	see Ta	ble 9a)									
	Jan	Feb	Mar	\downarrow	Apr	Мау	/	Jun	Jul	A	ug	Sep	Oct	: Nov)ec		

Total g	ains – ir	nternal a	nd solar	(84)m =	- (73)m -	+ (83)m	, watts							
(84)m=	390	406.13	421.57	442.69	460.19	452.02	430.48	407.14	383.2	368.97	369.44	377.34	I	(84)
7. Me	an inter	nal temp	erature	(heating	season)								
Temp	erature	during h	eating p	eriods ir	n the livir	ng area f	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisa	tion fac	tor for g	ains for l	living are	ea, h1,m	(see Ta	ble 9a)							
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
(86)m=	0.99	0.99	0.97	0.89	0.71	0.49	0.35	0.39	0.63	0.9	0.98	0.99	I	(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	20.62	20.69	20.8	20.94	20.99	21	21	21	21	20.94	20.77	20.61		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tł	ם. 12 (°C)					
(88)m=	20.44	20.45	20.45	20.46	20.46	20.47	20.47	20.47	20.47	20.46	20.46	20.45		(88)
Utilisa	ition fac	tor for g	ains for I	rest of d	welling, l	n2,m (se	e Table	9a)						
(89)m=	0.99	0.99	0.96	0.87	0.67	0.45	0.31	0.35	0.58	0.88	0.98	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (fo	ollow ste	ps 3 to 7	in Tabl	e 9c)				
(90)m=	19.94	20.03	20.2	20.39	20.45	20.47	20.47	20.47	20.47	20.4	20.17	19.93	I	(90)
•									f	LA = Livin	g area ÷ (4	l) =	0.35	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwel	ling) = fl	_A × T1	+ (1 – fL	A) × T2			•		

				-		• /							
(92)m=	20.18	20.26	20.41	20.58	20.64	20.65	20.65	20.66	20.65	20.58	20.38	20.17	(92)

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

(93)m=	20.18	20.26	20.41	20.58	20.64	20.65	20.65	20.66	20.65	20.58	20.38	20.17		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the r	nean int	ernal ter	nperatu	re obtair	ned at st	ep 11 of	Table 9t	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	tilisation	factor fo	or gains	using Ta	ble 9a			•	0			Du		
Litilio	Jan tion foo	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.99	0.98	0.96	. 0.87	0.68	0.46	0.33	0.36	0.6	0.88	0.98	0.99		(94)
Usefi		hmGm	W = (94	4)m x (84	4)m	0.10	0.00	0.00	0.0	0.00	0.00	0.00		(-)
(95)m=	386.33	399.68	405.34	385.81	314.01	210.19	140.82	147.16	228.7	325.65	360.46	374.48		(95)
Mont	hly avera	age exte	rnal tem	perature	e from Ta	able 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	loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m x	x [(93)m·	– (96)m]				
(97)m=	582.92	561.62	506.34	416.29	317.33	210.27	140.82	147.17	229.49	354.36	475.36	576.54		(97)
Spac	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	146.26	108.82	75.15	21.94	2.47	0	0	0	0	21.36	82.72	150.33		-
								Tota	l per year	(kWh/yeai) = Sum(9	8)15,912 =	609.06	(98)
Spac	e heating	g require	ement in	kWh/m²	/year								9.71	(99)
9b. En	ergy req	uiremen	ıts – Cor	nmunity	heating	scheme)							-1
This pa	art is use	ed for sp	ace hea	ting, spa	ace cool	ing or wa	ater heat	ing prov	ided by	a comm	unity sch	neme.		
Fractic	on of spa	ice heat	from se	condary,	/supplen	nentary	heating (Table 1	1) '0' if n	one			0	(301)
Fractio	on of spa	ice heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	heme may	∕ obtain he	eat from se	everal sou	rces. The p	orocedure	allows for	CHP and u	up to four	other heat	sources; ti	he latter	
includes Erection	s boilers, h	eat pumps	s, geotherr	nal and wa	aste heat f	rom powe	r stations.	See Apper	ndix C.				4	
			ommun		pump 					(0)			1	
Fractio	on of tota	al space	heat fro	m Comn	nunity he	eat pump	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r commu	inity hea	iting sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	commun	ity heati	ng systei	m					1.05	(306)
Space	heating	9											kWh/year	-
Annua	I space	heating	requirem	nent									609.06	
Space	heat fro	m Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	=	639.51	(307a)
Efficie	ncy of se	econdary	//supple	mentary	heating	system	in % (fro	m Table	e 4a or A	ppendix	E)		0	(308
Space	heating	requirer	ment fro	m secon	dary/su	oplemen	tary syst	em	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water	heating	I												
Annua	l water h	neating r	equirem	ent									1957.87	
lf DHV Water	V from co heat fro	ommunit m Comn	y schem nunity he	ne: eat pump	D				(64) x (30	03a) x (30	5) x (306) =	=	2055.77	(310a)
Electri	city used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	(310a)(310e)] =	26.95	(313)
Coolin	g Syster	n Energ	y Efficie	ncy Ratio	0								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electri	city for n	umps ar	nd fans v	within dv	vellina (1	Table 4f)	:							-
mecha	anical ve	ntilation	- balanc	ed, extra	act or po	sitive in	put from	outside					153.09	(330a)

DER WorkSheet: New dwelling design stage

warm air heating system fans			D	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	15:	3.09	(331)
Energy for lighting (calculated in Appendix L)		300).09	(332)
Electricity generated by PVs (Appendix M) (negative quantity)	-35	4.39	(333)
Total delivered energy for all uses $(307) + (309) + (310) + (310)$	2) + (315) + (331) + (332)(237b) =	27	94.06	(338)
12b. CO2 Emissions – Community heating scheme				

	Energy kWh/year	Emission factor kg CO2/kWh	^r Emissions kg CO2/year	
CO2 from other sources of space and water he Efficiency of heat source 1 (%)	eating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 349.71	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 13.99	(372)
Total CO2 associated with community systems	S (363)(366) + (368)(372))	= 363.7	(373)
CO2 associated with space heating (secondar	y) (309) x	0	= 0	(374)
CO2 associated with water from immersion he	ater or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water he	eating (373) + (374) + (375) =		363.7	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	= 79.45	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 155.75	(379)
Energy saving/generation technologies (333) t Item 1	o (334) as applicable	0.52 × 0.01 =	-183.93	(380)
Total CO2, kg/year sum of	(376)(382) =		414.97	(383)
Dwelling CO2 Emission Rate (383) -	- (4) =		6.61	(384)
El rating (section 14)			94.84	(385)

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documer	nt L1A, 2013 Edition	, England assessed by Stroma	FSAP 2012 program, Ver	sion: 1.0.5.16
Printed on 03 Augu Project Information	ist 2022 at 12:29:06			
	Dehum Demu (CTD)		Duilding Turner	
Assessed By:	Robyn Berry (STR	JU36659)	Building Type:	Flat
Dweiling Details:			Total Floor Areas 4	0.6m²
Site Deference :	BD Einchlov Road		Plot Poference:	103 BD Finchley Rd
Addross :	102 RD Einchlov R	d London NW2 5EV	r lot Kererence.	
Address .	TOS DE TINCHIey K			
Namo:				
Address :				
This report covers It is not a complet	s items included wi e report of regulation	thin the SAP calculations. ons compliance.		
1a TER and DER		- -		
Fuel for main heatin	ng system: Electricity	(c)		
Fuel factor: 1.55 (e	lectricity (c))	TED	04.00 1 - (
Dwelling Carbon Diox	kide Emission Rate (ioxide Emission Rate	IER) (DFR)	24.96 Kg/m² 6 94 kg/m²	OK
1b TFEE and DFE			0.0 r kg/m	UN
Target Fabric Energ	gy Efficiency (TFEE)		34.9 kWh/m ²	
Dwelling Fabric End	ergy Efficiency (DFE	E)	28.5 kWh/m ²	OK
2 Fabric U-values	5			UK
Element		Average	Highest	
External w	vall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall		0.00 (max. 0.20)	-	OK
Roof		(no roof)		
Openings		0.95 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal bridg	jing			
Thermal b	ridging calculated fro	om linear thermal transmittance	es for each junction	
3 Air permeabilit	y ility at 50 pascals		2.00 (design valu	10)
Maximum	inty at 50 pascals		10.0	OK
4 Heating efficier	ncv			
Main Heating	g system:	Community heating schemes	- Heat pump	
Secondary h	neating system:	None		
5 Cylinder insula	tion			
Hot water St	orage:	No cylinder		
6 Controls				
Space heatin Hot water co	ng controls ontrols:	Charging system linked to use No cylinder thermostat No cylinder	e of community heating, p	rogrammer and TRVs OK

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	6.65m ²	
Windows facing: South East	3.04m ²	
Ventilation rate:	2.00	
Blinds/curtains:	Light-coloured curtain or roller	r blind
	Closed 100% of daylight hour	S
10 Key features		
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Party Walls U-value	0 W/m²K	

Community heating, heat from electric heat pump

Photovoltaic array

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STR0036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: G04 BP Finchley RdAddress :G04 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m ²)Av. Height(m)Volume(m ³)Ground floor92.67(1a) \times 2.54(2a) =235.38(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)92.67(4)EastingColspan="4">Secondary othertotalm³ per hourOwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =235.38(5)Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4"Assessor Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address:G04 BP Finchley Rd, London, NW3 5EYColspan="4">Colspan="4"Address:G04 BP Finchley Rd, London, NW3 5EYColspan="4">Colspan="4"Colspan="4">Colspan="4">Colspan="4"Colspan="4"Colspan="4">Colspan="4">Colspan="4"Colspan="4"
Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: G04 BP Finchley RdAddress :G04 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Ground floor92.67(1a) \times 2.54(2a) $=$ 235.38(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)92.67(4)(3a)+(3b)+(3c)+(3d)+(3e)+(3n) $=$ 235.38(5)2. Ventilation rate:main heatingsecondary heatingother totaltotalm³ per hour
Property Address: G04 BP Finchley RdAddress :G04 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor92.67(1a) x2.54(2a) =235.38(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)92.67(4)(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =235.38(5)2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hour
Address :G04 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 92.67 $(1a) \times$ 2.54 $(2a) =$ 235.38 $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 92.67 (4) 92.67 (4) Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) =$ 235.38 (5) 2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hour
1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 92.67 (1a) x 2.54 (2a) = 235.38 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 92.67 (4) 92.67 (4)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 235.38 (5)2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hour
Area(m²)Av. Height(m)Volume(m³)Ground floor 92.67 $(1a) \times 2.54$ $(2a) = 235.38$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 92.67 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 235.38$ (5) 2. Ventilation rate: m^3 per hour
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 92.67(4)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n)$ 235.38(5)2. Ventilation rate:main heatingsecondary heatingother totaltotalm³ per hour
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 235.38 (5) 2. Ventilation rate: main secondary heating Main heating secondary heating other total m³ per hour
2. Ventilation rate: main secondary other total m ³ per hour heating heating
heating heating
Number of chimneys $0 + 0 + 0 = 0 $ x 40 = 0 (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 = 0$ (6b)
Number of intermittent fans
Number of passive vents $0 x 10 = 0 (7b)$
Number of flueless gas fires $0 \times 40 = 0 (7c)$
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)
Additional infiltration $[(9)-1]x(0.1 - 0) = 0$ (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped 0 (14)
Window Inflitration $0.25 \cdot [0.2 \times (14) \div 100] =$ 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (15)
Air permeability value $a50$ expressed in cubic metres per bour per square metre of envelope area $\frac{3}{2}$ (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$ 0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.12$ (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 /
$(22) \Pi = \begin{bmatrix} 3.1 & 5 & 4.9 & 4.4 & 4.5 & 3.6 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$
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

DER WorkSheet: New dwelling design stage

Adjuste	ed infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	= (21a) x	(22a)m					
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calcula	ate effec	ctive air	change i	rate for t	he appli	cable ca	se			•				
IT ME	echanica			andix NL (2	2h) _ (22a) v Emy (c	austion (muioo (22)	(22a)			0.5	(23a)
If bold	aust air ne		using Appe		(23a) = (23a)	i) × FIIIV (e	equation (no)) , othe) = (23a)			0.5	(23b)
		i neat rect	overy: enici		allowing in	or in-use is			i) =			4 (00 s)	76.5	(23c)
a) If	balance	d mech	anical ve	ntilation	with hea		ery (MV	HR) (24) T	a)m = (2	2b)m + ()	23b) × ['	1 – (23c)	÷ 100]	(242)
(24a)m=	0.27	0.20	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.20	0.25		(24a)
D) IT	balance		anical ve	ntilation	without	neat rec		VIV) (241 1	D = (2)	20)m + (. T	23D)			(24b)
(240)III=		0								0	0	0		(240)
c) n i	f (22b)n	0.03e ex 1 < 0.5 x	(23b) t	hen (24a	r positiv c) = (23b). other	ventilati vise (24	(1000) = (22)	buiside b) m + 0	5 x (23h))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	e positiv	e input	ı ventilati	on from	I loft					
i i	f (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	rwise (2	4d)m =	0.5 + [(2	22b)m² x	0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effec	ctive air	change	rate - en	ter (24a) or (24b	o) or (24	c) or (24	ld) in bo	x (25)	_		_		
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. He	at losse	s and he	eat loss r	paramete	er:									
ELEN	IENT	Gros area	ss (m²)	Openin m	gs ²	Net Ar A ,r	rea m²	U-val W/m2	ue 2K	A X U (W/I	<)	k-value kJ/m²·ł) <	A X k kJ/K
Doors						2.1	x	1.2	=	2.52				(26)
Window	ws Type	e 1				3.576	3 x1	/[1/(0.9)+	- 0.04] =	3.11				(27)
Window	ws Type	2				7.181	 x1	/[1/(0.9)+	- 0.04] =	6.24				(27)
Window	ws Type	3				3.098	 3 x1	/[1/(0.9)+	- 0.04] =	2.69	\exists			(27)
Window	ws Type	e 4				3.098	 3 x1	/[1/(0.9)+	- 0.04] =	2.69	\exists			(27)
Windov	vs Tvpe	5				3 376	<u> </u>	/[1/(0.9)+	- 0.04] =	2.93				(27)
Floor	- 71 -					92.66	<u> </u>			9 2668	Ξ r			(28)
Walls 1	Tvpe1	69	2	20.3	3	48.87	~ ×	0.15	╡_	7 33			\dashv	(29)
Walls 1	Type2	4.0	6	20.0		1.06	_ ^	0.13		0.28	╡╏		\dashv	(29)
Total a	rea of e	lements	0 m ²	2.1		165.0	^ ^	0.14		0.20	L			(21)
Party w	vall	lemento	,			24.09								
Party c	eilina					02.67	<u> </u>	0		0	L r		\dashv	(32b)
* for win	dows and	roof wind		ffective wi	ndow H-va	92.07	ated usin	a formula '	1/[(1/ _vəl	مد(میں	L s aiven in	naragraph		(320)
** includ	e the area	as on both	sides of in	ternal wal	ls and part	itions		gronnala		uo)10.04j u	lo givoir in	paragraph	0.2	
Fabric	heat los	s, W/K	= S (A x	U)				(26)(30) + (32) =				37.05	(33)
Heat ca	apacity	Cm = S((A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	14353.6	8 (34)
Therma	al mass	parame	eter (TMF	P = Cm ÷	- TFA) in	ı kJ/m²K			Indica	ative Value	Medium		250	(35)
For desi can be u	gn assess ised instea	ments wh ad of a de	ere the de tailed calcu	tails of the ulation.	constructi	on are not	t known p	recisely th	e indicativ	e values of	TMP in Ta	able 1f		
Therma	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						4.22	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								

DER WorkSheet: New dwelling design stage

Total fa	abric he	at loss							(33) +	(36) =		[41.27	(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=	20.64	20.41	20.19	19.06	18.83	17.7	17.7	17.48	18.16	18.83	19.29	19.74		(38)
Heat tr	ansfer o	coefficier	nt, W/K				-		(39)m	= (37) + (3	38)m			
(39)m=	61.91	61.69	61.46	60.33	60.1	58.98	58.98	58.75	59.43	60.1	60.56	61.01		
Heat lo	oss para	meter (H	HLP), W/	′m²K					ر (40)m	Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	60.27	(39)
(40)m=	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.64	0.65	0.65	0.66		
Numbe	er of day	rs in mor	nth (Tab	le 1a)					,	Average =	Sum(40)1	12 /12=	0.65	(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)
							1	1						
4. Wa	ter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
Assum	ed occu	ipancy. I	N								2	66		(42)
if TF	A > 13.9	9, N = 1	+ 1.76 x	[1 - exp	(-0.0003	49 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	FFA -13.	9)			(/
if TF	A £ 13.9	θ , N = 1	tor upor	no in litro	e por da	w Vd av	orago –	(25 v NI)	1.26				l	(40)
Reduce	the annua	al average	hot water	usage by a	5% if the d	welling is	designed i	(25 X N) to achieve	+ 30 a water us	se target o	97	.39		(43)
not more	e that 125	litres per p	person per	day (all w	ater use, h	not and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)					L	
(44)m=	107.13	103.23	99.33	95.44	91.54	87.65	87.65	91.54	95.44	99.33	103.23	107.13		
Energy	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600) kWh/mor	Total = Su oth (see Ta	m(44) ₁₁₂ = bles 1b, 1	c, 1d)	1168.64	(44)
(45)m=	158.86	138.94	143.38	125	119.94	103.5	95.91	110.06	111.37	129.79	141.68	153.85		
lf instan	taneous w	ater heatii	ng at point	of use (no	hot water	· storage),	enter 0 in	boxes (46,	-) to (61)	Fotal = Su	m(45) ₁₁₂ =		1532.28	(45)
(46)m=	23.83	20.84	21.51	18.75	17.99	15.52	14.39	16.51	16.71	19.47	21.25	23.08		(46)
Water	storage	loss:												
Storag	e volum	e (litres)	includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel	(0		(47)
If com	munity h	eating a	nd no ta	nk in dw	elling, e	nter 110) litres in	(47)	`					
Otherv Water	vise it no	o stored	hot wate	er (this in	ICIUDES I	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
a) If m	anufact	urer's de	eclared le	oss facto	or is kno	wn (kWł	n/dav):				(n		(48)
Tempe	erature f	actor fro	m Table	2b		,	,					0		(49)
Energy	/ lost fro	m water	storage	, kWh/ye	ear			(48) x (49)	=		1	10		(50)
b) If m	anufact	urer's de	eclared o	ylinder I	oss facto	or is not	known:							
Hot wa	ter stor	age loss	factor fr	om Tabl	e 2 (kWl	h/litre/da	ay)				0.	02		(51)
Volum	nunity n e factor	from Tal	ee secu ble 2a	on 4.3							1	02		(52)
Tempe	erature f	actor fro	m Table	2b							0.	.6		(52)
Energy	/ lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter	(50) or ((54) in (5	55)	-							1.	03		(55)

DER WorkSheet: New dwelling design stage

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	s dedicated	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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (an	nual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal	culated f	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(moo	dified by	factor fr	om Tab	le H5 if t	here is s	olar wat	er heatir	ng and a	cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss ca	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	214.14	188.87	198.65	178.49	175.22	156.99	151.18	165.33	164.86	185.07	195.17	209.13		(62)
Solar DH	HW input o	calculated	using App	endix G or	Appendix	H (negativ	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or V	WWHRS	applies,	, see Ap	pendix C	G)			-		
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from wa	ater hea	ter											
(64)m=	214.14	188.87	198.65	178.49	175.22	156.99	151.18	165.33	164.86	185.07	195.17	209.13		
								Outp	out from w	ater heater	r (annual) ₁	12	2183.12	(64)
Heat g	ains froi	n water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m=	97.04	86.14	91.89	84.36	84.1	77.21	76.11	80.81	79.83	87.38	89.9	95.38		(65)
inclu	ıde (57)ı	m in calc	culation of	of (65)m	only if c	ylinder is	s in the c	dwelling	or hot w	ater is fr	om com	ı munity h	eating	
inclu 5. Int	ide (57)i ernal ga	m in calc ains (see	culation of Table 5	of (65)m and 5a)	only if c):	ylinder is	s in the c	dwelling	or hot w	ater is fr	om com	nunity h	eating	
inclu 5. Int Metabo	ide (57)i ernal ga olic gain	m in calc ains (see s (Table	culation of Table 5	of (65)m and 5a) ts	only if c):	ylinder is	s in the c	dwelling	or hot w	ater is fr	om com	r munity h	eating	
inclu 5. Int Metabo	ide (57)i ernal ga olic gain Jan	m in calc ains (see s (Table Feb	culation of Table 5 5), Wat Mar	of (65)m and 5a) ts Apr	only if c): May	ylinder is Jun	s in the c Jul	dwelling	or hot w Sep	ater is fr Oct	om com Nov	munity h	eating	
inclu 5. Int Metabo (66)m=	ide (57)i ernal ga olic gain Jan 133.03	n in calc ains (see s (Table Feb 133.03	culation of Table 5 5), Wat Mar 133.03	of (65)m and 5a ts Apr 133.03	only if c): May 133.03	ylinder is Jun 133.03	s in the o Jul 133.03	dwelling Aug 133.03	or hot w Sep 133.03	ater is fr Oct 133.03	om com Nov 133.03	munity h Dec 133.03	eating	(66)
inclu 5. Int Metabo (66)m= Lightin	ide (57)r ernal ga olic gain Jan 133.03 g gains	m in calo ins (see s (Table Feb 133.03 (calculat	Table 5 5), Wat Mar 133.03 ted in Ap	of (65)m and 5a ts Apr 133.03 opendix	only if c): May 133.03 L, equati	Jun 133.03	Jul 133.03 r L9a), a	Aug 133.03 Iso see	or hot w Sep 133.03 Table 5	Oct 133.03	om com Nov 133.03	Dec	eating	(66)
inclu 5. Int Metabo (66)m= Lightin (67)m=	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75	m in calo ains (see s (Table Feb 133.03 (calculat 19.32	ted in Ap	of (65)m and 5a ts Apr 133.03 opendix 11.9	only if c : May 133.03 L, equati 8.89	ylinder is Jun 133.03 on L9 or 7.51	Jul 133.03 (L9a), a 8.11	Aug 133.03 Iso see 10.54	or hot w Sep 133.03 Table 5 14.15	Oct 133.03	om com Nov 133.03 20.97	Dec 133.03	eating	(66)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces gai	m in calc ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc	ted in Ap 133.03 ted in Ap 134.71 ulated in	of (65)m and 5a ts Apr 133.03 opendix 11.9	only if c): 133.03 L, equati 8.89 dix L, eq	ylinder is Jun 133.03 on L9 or 7.51 uation L	Jul 133.03 r L9a), a 8.11 13 or L13	Aug 133.03 Iso see 10.54 3a), also	or hot w Sep 133.03 Table 5 14.15 see Ta	Oct 133.03 17.97 ble 5	om com Nov 133.03 20.97	Dec 133.03 22.36	eating	(66) (67)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m=	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43	culation (Table 5 5), Wat 133.03 ted in Ap 15.71 ulated in 240.05	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48	only if c): 133.03 L, equati 8.89 dix L, eq 209.34	ylinder is Jun 133.03 on L9 or 7.51 uation L ² 193.23	Jul 133.03 r L9a), a 8.11 13 or L1 182.47	Aug 133.03 Iso see 10.54 3a), also 179.94	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31	Oct 133.03 17.97 ble 5 199.89	om com Nov 133.03 20.97 217.03	Dec 133.03 22.36	eating	(66) (67) (68)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains	m in calo ains (see S (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula	culation of Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in A	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48 opendix	only if c): 133.03 L, equati 8.89 dix L, eq 209.34 L, equat	ylinder is Jun 133.03 ion L9 or 7.51 uation L 193.23 ion L15	Jul 133.03 r L9a), a 8.11 13 or L1: 182.47 or L15a)	Aug 133.03 Iso see 10.54 3a), also 179.94), also se	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31 ee Table	Oct 133.03 17.97 ble 5 199.89 5	om com Nov 133.03 20.97 217.03	Dec 133.03 22.36 233.14	eating	(66) (67) (68)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m=	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces ga 243.9 ng gains 36.3	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calculat 36.3	culation (Table 5 5), Wat 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48 opendix 36.3	only if c): 133.03 L, equati 8.89 dix L, equat 209.34 L, equat 36.3	ylinder is Jun 133.03 on L9 or 7.51 uation L 193.23 ion L15 36.3	Jul 133.03 r L9a), a 8.11 13 or L1 182.47 or L15a) 36.3	Aug 133.03 Iso see 10.54 3a), also 179.94 , also se 36.3	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31 ee Table 36.3	Oct 133.03 17.97 ble 5 199.89 5 36.3	om com Nov 133.03 20.97 217.03 36.3	munity h Dec 133.03 22.36 233.14 36.3	eating	(66) (67) (68) (69)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps	de (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 s and far	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calculat 36.3 as gains	culation (Table 5 5), Wat 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48 opendix 36.3 5a)	only if c): 133.03 L, equati 8.89 dix L, equ 209.34 L, equat 36.3	ylinder is Jun 133.03 on L9 or 7.51 uation L 193.23 ion L15 36.3	Jul 133.03 (L9a), a 8.11 13 or L1 182.47 or L15a) 36.3	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3	or hot w Sep 133.03 Table 5 14.15 9 see Ta 186.31 9 see Table 36.3	Oct 133.03 17.97 ble 5 199.89 5 36.3	om com Nov 133.03 20.97 217.03 36.3	munity h Dec 133.03 22.36 233.14 36.3	eating	(66) (67) (68) (69)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m=	ide (57)i ernal ga olic gain Jan 133.03 g gains 21.75 nces ga 243.9 ng gains 36.3 and far 0	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 ns gains 0	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0	of (65)m and 5a ts Apr 133.03 opendix 11.9 Appendix 226.48 opendix 36.3 5a) 0	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equat 36.3	ylinder is Jun 133.03 ion L9 or 7.51 uation L 193.23 ion L15 36.3	Jul 133.03 r L9a), a 8.11 13 or L1: 182.47 or L15a) 36.3	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31 se Table 36.3	Oct 133.03 17.97 ble 5 199.89 5 36.3 0	om com Nov 133.03 20.97 217.03 36.3	munity h Dec 133.03 22.36 233.14 36.3	eating	(66) (67) (68) (69) (70)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m=	ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 and far 0 s e.g. ev	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 ns gains 0 aporatio	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48 opendix 36.3 5a) 0 tive valu	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equat 36.3 0 es) (Tab	ylinder is Jun 133.03 ion L9 or 7.51 uation L ² 193.23 ion L15 36.3 0 le 5)	Jul 133.03 r L9a), a 8.11 13 or L1 182.47 or L15a) 36.3	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31 ee Table 36.3	Oct 133.03 17.97 ble 5 199.89 5 36.3 0	om com Nov 133.03 20.97 217.03 36.3 0	Munity h	eating	(66) (67) (68) (69) (70)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	Ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 and far 0 s e.g. ev -106.42	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 (calcula 36.3 ns gains 0 aporatio -106.42	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat -106.42	of (65)m and 5a ts Apr 133.03 opendix 11.9 Appendix 226.48 opendix 36.3 5a) 0 tive valu -106.42	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equati 36.3 0 es) (Tab -106.42	ylinder is Jun 133.03 on L9 or 7.51 uation L ² 193.23 ion L15 36.3 0 le 5) -106.42	Jul 133.03 (L9a), a 8.11 13 or L1 182.47 or L15a) 36.3 0	Aug 133.03 Iso see 10.54 3a), also 179.94 36.3 0	or hot w Sep 133.03 Table 5 14.15 See Ta 186.31 See Table 36.3 0	Oct 133.03 17.97 ble 5 199.89 5 36.3 0 -106.42	om com Nov 133.03 20.97 217.03 36.3 0	munity h Dec 133.03 22.36 233.14 36.3 0	eating	(66) (67) (68) (69) (70)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water	ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 s and far 0 s e.g. ev -106.42 heating	m in calo ains (see 5 (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 (calcula 36.3 ns gains 0 aporatio -106.42 gains (T	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat -106.42 Table 5)	of (65)m and 5a ts Apr 133.03 opendix 11.9 Appendix 226.48 opendix 36.3 5a) 0 tive valu -106.42	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equat 36.3 0 es) (Tab -106.42	ylinder is Jun 133.03 ion L9 or 7.51 uation L 193.23 ion L15 36.3 0 le 5) -106.42	Jul 133.03 (L9a), a 8.11 13 or L1: 182.47 or L15a) 36.3 0	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3 0 -106.42	or hot w Sep 133.03 Table 5 14.15 see Ta 186.31 ee Table 36.3 0 -106.42	Oct 133.03 17.97 ble 5 199.89 5 36.3 0 -106.42	om com Nov 133.03 20.97 217.03 36.3 0 -106.42	munity h Dec 133.03 22.36 233.14 36.3 0 -106.42	eating	(66) (67) (68) (69) (70) (71)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	Ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 and far 0 s e.g. ev -106.42 heating 130.44	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 (calcula 36.3 ns gains 0 aporatio -106.42 gains (T 128.19	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat -106.42 Table 5) 123.51	of (65)m and 5a ts Apr 133.03 opendix 11.9 Appendix 226.48 opendix 36.3 5a) 0 tive valu -106.42	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equati 36.3 0 es) (Tab -106.42	ylinder is Jun 133.03 on L9 or 7.51 uation L 193.23 ion L15 36.3 0 le 5) -106.42	s in the c Jul 133.03 r L9a), a 8.11 13 or L1 182.47 or L15a) 36.3 0 -106.42	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3 0 -106.42	or hot w Sep 133.03 Table 5 14.15 See Ta 186.31 ee Table 36.3 0 -106.42	Oct 133.03 17.97 ble 5 199.89 5 36.3 0 -106.42 117.44	om com Nov 133.03 20.97 217.03 36.3 0 -106.42 124.86	munity h Dec 133.03 22.36 233.14 36.3 0 -106.42 128.2	eating	(66) (67) (68) (69) (70) (71)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i	Ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 and far 0 s e.g. ev -106.42 heating 130.44	m in calo ains (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 (calcula 36.3 ns gains 0 aporatio -106.42 gains (T 128.19 gains =	culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat -106.42 Table 5) 123.51	of (65)m and 5a ts Apr 133.03 opendix 11.9 Appendix 226.48 opendix 36.3 5a) 0 tive valu -106.42	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equati 36.3 0 es) (Tab -106.42 113.04	ylinder is Jun 133.03 on L9 or 7.51 uation L ² 193.23 ion L15 36.3 0 le 5) -106.42 107.23 (66)	s in the c Jul 133.03 r L9a), a 8.11 13 or L1: 182.47 or L15a) 36.3 0 -106.42 102.3 m + (67)m	Aug 133.03 Iso see 10.54 3a), also 179.94 0, also see 36.3 0 -106.42 108.62 + (68)m +	or hot w Sep 133.03 Table 5 14.15 9 see Ta 186.31 9 Table 36.3 0 -106.42 110.87 - (69)m + 1	Oct 133.03 17.97 ble 5 199.89 5 36.3 0 -106.42 117.44 (70)m + (7)	om com Nov 133.03 20.97 217.03 36.3 0 -106.42 124.86 1)m + (72)	munity h Dec 133.03 22.36 233.14 36.3 0 -106.42 128.2	eating	(66) (67) (68) (69) (70) (71) (72)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i (73)m=	Ide (57)r ernal ga olic gain Jan 133.03 g gains 21.75 nces gai 243.9 ng gains 36.3 and far 0 s e.g. ev -106.42 heating 130.44 nternal 459	m in calo ins (see s (Table Feb 133.03 (calculat 19.32 ins (calc 246.43 (calcula 36.3 (calcula 36.3 (calcula 36.3 0 aporatio -106.42 gains (T 128.19 gains = 456.85	Culation (Table 5 5), Wat Mar 133.03 ted in Ap 15.71 ulated in 240.05 ted in Ap 36.3 (Table 5 0 n (negat -106.42 able 5) 123.51	of (65)m and 5a ts Apr 133.03 opendix 11.9 Append 226.48 opendix 36.3 5a) 0 tive valu -106.42 117.16	only if c): 133.03 L, equati 8.89 dix L, equati 209.34 L, equati 36.3 0 es) (Tab -106.42 113.04	ylinder is Jun 133.03 ion L9 or 7.51 uation L ² 193.23 ion L15 36.3 0 le 5) -106.42 107.23 (66) 370.88	s in the c Jul 133.03 r L9a), a 8.11 13 or L1: 182.47 or L15a) 36.3 0 -106.42 102.3 m + (67)m 355.79	Aug 133.03 Iso see 10.54 3a), also 179.94), also se 36.3 0 -106.42 108.62 + (68)m - 362.01	or hot w Sep 133.03 Table 5 14.15 See Ta 186.31 See Table 36.3 0 -106.42 110.87 - (69)m + 1 374.24	Oct 133.03 17.97 ble 5 199.89 5 36.3 0 -106.42 117.44 (70)m + (7) 398.21	om com Nov 133.03 20.97 217.03 36.3 0 -106.42 124.86 1)m + (72) 425.78	munity h Dec 133.03 22.36 233.14 36.3 0 -106.42 128.2 m 446.6	eating	(66) (67) (68) (69) (70) (71) (72)

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

Orienta	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	3.1	x	10.63	x	0.35	x	0.8] =	6.39	(74)
North	0.9x	0.77	x	3.1	x	20.32	x	0.35	x	0.8	=	12.22	(74)
North	0.9x	0.77	x	3.1	×	34.53	x	0.35	×	0.8] =	20.76	(74)
North	0.9x	0.77	x	3.1	×	55.46	x	0.35	×	0.8] =	33.34	(74)
North	0.9x	0.77	x	3.1	x	74.72	x	0.35	x	0.8	=	44.91	(74)
North	0.9x	0.77	x	3.1	x	79.99	x	0.35	x	0.8	=	48.08	(74)
North	0.9x	0.77	x	3.1	x	74.68	x	0.35	x	0.8	=	44.89	(74)
North	0.9x	0.77	x	3.1	x	59.25	x	0.35	x	0.8	=	35.62	(74)
North	0.9x	0.77	x	3.1	×	41.52	x	0.35	×	0.8] =	24.96	(74)
North	0.9x	0.77	x	3.1	×	24.19	x	0.35	×	0.8	=	14.54	(74)
North	0.9x	0.77	x	3.1	x	13.12	x	0.35	x	0.8] =	7.89	(74)
North	0.9x	0.77	x	3.1	×	8.86	x	0.35	×	0.8	=	5.33	(74)
South	0.9x	0.77	x	3.1	×	46.75	x	0.35	x	0.8	=	28.1	– (78)
South	0.9x	0.77	x	3.1	x	76.57	x	0.35	x	0.8	=	46.03	(78)
South	0.9x	0.77	x	3.1	×	97.53	x	0.35	×	0.8	=	58.63	
South	0.9x	0.77	x	3.1	×	110.23	x	0.35	x	0.8	=	66.27	(78)
South	0.9x	0.77	x	3.1	x	114.87	x	0.35	x	0.8	=	69.05	(78)
South	0.9x	0.77	x	3.1	×	110.55	x	0.35	×	0.8	=	66.45	(78)
South	0.9x	0.77	x	3.1	×	108.01	x	0.35	x	0.8	=	64.93	(78)
South	0.9x	0.77	x	3.1	x	104.89	x	0.35	x	0.8	=	63.06	(78)
South	0.9x	0.77	x	3.1	×	101.89	x	0.35	×	0.8	=	61.25	(78)
South	0.9x	0.77	x	3.1	×	82.59	x	0.35	×	0.8] =	49.65	(78)
South	0.9x	0.77	x	3.1	×	55.42	×	0.35	×	0.8	=	33.31	(78)
South	0.9x	0.77	x	3.1	×	40.4	x	0.35	×	0.8] =	24.28	(78)
Southwe	st <mark>0.9</mark> x	0.77	x	3.58	x	36.79]	0.35	x	0.8	=	25.53	(79)
Southwe	st <mark>0.9</mark> x	0.77	x	3.58	x	62.67]	0.35	x	0.8	=	43.49	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	x	85.75]	0.35	x	0.8] =	59.5	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	x	106.25]	0.35	x	0.8	=	73.73	(79)
Southwe	est <mark>0.9</mark> x	0.77	x	3.58	x	119.01]	0.35	x	0.8	=	82.58	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	x	118.15]	0.35	x	0.8	=	81.98	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	x	113.91		0.35	x	0.8	=	79.04	(79)
Southwe	est <mark>0.9</mark> x	0.77	x	3.58	x	104.39]	0.35	x	0.8	=	72.44	(79)
Southwe	st <mark>0.9</mark> x	0.77	x	3.58	x	92.85]	0.35	x	0.8	=	64.43	(79)
Southwe	st <mark>0.9</mark> x	0.77	x	3.58	x	69.27]	0.35	x	0.8	=	48.06	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	×	44.07]	0.35	×	0.8] =	30.58	(79)
Southwe	est <mark>o.9</mark> x	0.77	x	3.58	×	31.49]	0.35	×	0.8] =	21.85	(79)
West	0.9x	0.77	x	7.18	×	19.64	x	0.35	×	0.8] =	27.37	(80)
West	0.9x	0.77	x	7.18	x	38.42	x	0.35	x	0.8] =	53.54	(80)
West	0.9x	0.77	x	7.18	x	63.27	x	0.35	x	0.8	=	88.16	(80)

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

West	0.9x	0.77		x	7.1	8	x	g	2.28	x		0.35	x	0.8	=		128.58	(80)
West	0.9x	0.77		x	7.1	8	x	1	13.09	x		0.35	x	0.8	=		157.58	(80)
West	0.9x	0.77		x	7.1	8	x	1	15.77	x		0.35	x	0.8			161.31	(80)
West	0.9x	0.77		x	7.1	8	x	1	10.22	x		0.35	×	0.8	=		153.58	(80)
West	0.9x	0.77		x	7.1	8	x	g	94.68	×		0.35	x	0.8	=		131.92	(80)
West	0.9x	0.77		x	7.1	8	x	7	3.59	x		0.35	x	0.8	=		102.54	(80)
West	0.9x	0.77		x	7.1	8	x	4	5.59	x		0.35	×	0.8	=		63.52	(80)
West	0.9x	0.77		x	7.1	8	x	2	24.49	x		0.35	x	0.8	=		34.12	(80)
West	0.9x	0.77		x	7.1	8	x	1	6.15	x		0.35	x	0.8	=		22.51	(80)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	1	1.28	x		0.35	×	0.8	=		7.39	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	2	2.97	x		0.35	×	0.8	=		15.05	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	4	1.38	x		0.35	x	0.8	=		27.11	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	6	67.96	x		0.35	x	0.8	=		44.52	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	g	91.35	x		0.35	x	0.8	=		59.84	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	g	97.38	x		0.35	×	0.8	=		63.79	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x		91.1	x		0.35	x	0.8	=		59.68	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	7	2.63	x		0.35	x	0.8	=		47.58	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	5	50.42	x		0.35	×	0.8	=		33.03	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	2	28.07	x		0.35	x	0.8	=		18.39	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	· ·	14.2	x		0.35	x	0.8	=		9.3	(81)
Northw	est <mark>0.9x</mark>	0.77		x	3.3	8	x	9	9.21	x		0.35	×	0.8	=		6.04	(81)
Solar (pains in	watts, c	alcula	ted	for each	n mont	h		r	(83)m	ו = Sו	um(74)m	(82)m		1	_		
(83)m=	94.79	170.31	254.	16	346.43	413.97	4	21.63	402.12	350	0.6	286.2	194.16	6 115.2	80			(83)
Total g	jains – i	internal a	and so	blar	(84)m =	: (73)m	1+(83)m	, watts					-1		_		
(84)m=	553.78	627.16	696.3	35	764.88	808.15	5 7	92.51	757.9	712	.61	660.44	592.37	7 540.98	526.6			(84)
7. Me	an inte	rnal temp	peratu	ire ((heating	seaso	n)											
Temp	erature	e during h	neatin	g p	eriods in	the liv	/ing	area	from Tab	ble 9	, Th	1 (°C)					21	(85)
Utilisa	ation fa	ctor for g	ains f	or li	iving are	a, h1,ı	m (s	ее Та	ble 9a)						-	_		_
	Jan	Feb	Ma	ar	Apr	May	′	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	;		
(86)m=	1	0.99	0.97	7	0.87	0.68		0.48	0.34	0.3	38	0.62	0.91	0.99	1			(86)
Mean	interna	al temper	ature	in l	iving are	ea T1 (follo	ow ste	ps 3 to 7	7 in T	able	e 9c)						
(87)m=	20.46	20.59	20.7	6	20.93	20.99		21	21	2	1	21	20.91	20.66	20.44			(87)
Temp	erature	e during h	neatin	a p	eriods in	rest o	of dv	velling	from Ta	able	9. Tł	ים. 12 (°C)						
(88)m=	20.37	20.37	20.3	7	20.38	20.39	Ť	20.4	20.4	20	.4	20.39	20.39	20.38	20.38			(88)
l Itilis:	ation fai	- ctor for a	i ains f	or r	est of dy	vellina	 h2	m (se	e Table	(9a)								
(89)m=	1	0.99	0.96	3	0.84	0.64	, <u>2</u>	0.43	0.3	0.3	33	0.56	0.89	0.99	1			(89)
Moon				in t	he rest r	of dwo		- T2 /f		<u>، مەر</u>		/ in Tabl			I			
(90)m=	19.65	19.83	20.0	7 T	20.3	20.38	T	20.4	20.4	20 20		20.39	20.28	19.94	19.62	٦		(90)
(,			L						L			f	LA = Liv	ving area ÷ (4	4) =	+	0.38) (91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

(92)m=	19.96	20.12	20.33	20.54	20.61	20.63	20.63	20.63	20.62	20.52	20.22	19.94		(92)
Apply	adjustn	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.96	20.12	20.33	20.54	20.61	20.63	20.63	20.63	20.62	20.52	20.22	19.94		(93)
8. Spa	ace hea	ting requ	uirement											
Set Ti	to the r	nean int	ternal ter	mperatur using Ta	e obtain	ied at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calo	culate	
the ut	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	<u> </u>					1					
(94)m=	0.99	0.99	0.96	0.85	0.65	0.45	0.31	0.35	0.58	0.89	0.99	1		(94)
Usefu	l gains,	hmGm	, W = (94	4)m x (84	4)m						-	-		
(95)m=	550.97	618.51	665.62	649.2	529.22	355.3	237.62	248.52	385.66	529.34	533	524.69		(95)
Month	nly avera	age exte	ernal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	oss rate	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			I	(07)
(97)m=	969.64	938.76	850.23	702.46	535.73	355.56	237.63	248.55	387.69	596.45	794.3	960.26		(97)
Space	e heatin	g require	ement fo	r each m			h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m	224.06	I	
(90)11=	511.49	210.2	137.33	30.30	4.00	0	0	Tota		49.93	100.14	324.00	1260.27	1 (98)
Snace	Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ =												13.7](99)
	ricatin	grequit			/year								13.7](00)
90. EN	ergy rec	luiremer	nts – Coi	mmunity	neating	scneme			tala al la c					
Fractio	n of spa	ace heat	from se	condary	supplen/	ng or wa nentary l	neating (Table 1	10ed by a 1) '0' if n	a comm one	unity scr	neme.	0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (301	l) =						1	(302)
The com	munity so	heme ma	y obtain he	eat from se	everal sour	rces. The p	procedure	allows for	CHP and ι	up to four (other heat	sources; t	he latter	
includes Fractio	boilers, h n of hea	eat pumps at from C	s, geotheri Commun	<i>nal and wa</i> itv heat i	aste heat f oump	rom powei	r stations.	See Appei	ndix C.				1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and (charging	method	(Table	4c(3)) fo	r commu	unity hea	iting syst	tem		,	1	(305)
Distribu	ution los	s factor	(Table 1	I2c) for c	commun	ity heatir	ng syste	m					1.05	(306)
Space	heating	a											kWh/vear	J
Annual	space	heating	requiren	nent									1269.37]
Space	heat fro	m Comr	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	1332.84	(307a)
Efficier	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water Annual	heating water h	l neating r	equirem	ent									2183.12]
lf DHW Water	/ from co heat fro	ommuni m Comr	ty schen nunity he	ne: eat pumr)				(64) x (30)3a) x (30	5) x (306) :	=	2292.27	_ (310a)
Electric	city used	d for hea	, at distrib	ution				0.01	× [(307a).	(307e) +	· (310a)((310e)] =	36.25](313)
Coolin	g Syster	n Energ	y Efficie	ncy Ratio	C								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
-	5				-		•							1

DER WorkSheet: New dwelling design stage

Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	velling (Table 4f): act or positive input fro	m outside		226.14	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330t) + (330g) =	226.14	(331)
Energy for lighting (calculated in Appen	dix L)			384.17	(332)
Electricity generated by PVs (Appendix	M) (negative quantity))		-525.5	(333)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	2)(237b) =	3709.93	(338)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	vater heating (not CHF If there is CHP us	?) sing two fuels repeat (363) to	(366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b	b)+(310b)] x 100 ÷ (367b) x	0.52	= 470.36	(367)
Electrical energy for heat distribution		[(313) x	0.52	= 18.81	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372)	= 489.17	(373)
CO2 associated with space heating (se	condary)	(309) x	0	= 0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and w	vater heating	(373) + (374) + (375) =		489.17	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	= 117.37	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	= 199.39	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appl	icable	0.52 × 0.01 =	-272.73	(380)
Total CO2, kg/year	sum of (376)(382) =			533.19	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			5.75	(384)
El rating (section 14)				94.81	(385)

DER WorkSheet: New dwelling design stage

User Details:	
Assessor Name: Robyn Berry Stroma Number: STRO	036659
Software Name:Stroma FSAP 2012Software Version:Version	n: 1.0.5.16
Property Address: 306 BP Finchley Rd	
Address : 306 BP Finchley Rd, London, NW3 5EY	
1. Overall dwelling dimensions:	
Area(m²)Av. Height(m)Ground floor 89.7 (1a) x 2.54 (2a) =	227.83 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 89.7 (4)	
Dwelling volume $(3a)+(3c)+(3c)+(3d)+(3e)+(3n) =$	227.83 (5)
2. Ventilation rate:	m3 nor hour
heating heating	m ^o per nour
Number of chimneys 0 + 0 = 0 × 40 =	0 (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 =$	0 (6b)
Number of intermittent fans 0 × 10 =	0 (7a)
Number of passive vents $0 \times 10 =$	0 (7b)
Number of flueless gas fires $0 \times 40 =$	0 (7c)
Air ch	anges per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$	0 (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)	0 (9)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0 (10)
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	0(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0 (12)
If no draught lobby, enter 0.05, else enter 0	0 (13)
Percentage of windows and doors draught stripped	0 (14)
Window Infiltration $0.25 - [0.2 \times (14) - 100] =$ Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =	0 (15)
Air permeability value, $a50$, expressed in cubic metres per hour per square metre of envelope area	0 (16)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	
Number of sides sheltered	3 (19)
Shelter factor $(20) = 1 - [0.075 \times (19)] =$	0.78 (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	
	0.12 (21)
Infiltration rate modified for monthly wind speed	0.12 (21)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	0.12 (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	0.12 (21)
Infiltration rate modified for monthly wind speedJanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7(22)m=5.154.94.44.33.83.83.744.34.54.7	0.12 (21)
Infiltration rate modified for monthly wind speedJanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7 $(22)m=$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m $\div 4$	0.12 (21)

DER WorkSheet: New dwelling design stage

Adjuste	ed infiltr	ation rat	te (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calcula If me	ate ette echanica	c <i>tive air</i> al ventila	change	rate for t	he appli	cable ca	se					I	0.5	(23a)
lf exh	aust air h	eat pump	using App	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (N	N5)), othei	rwise (23b) = (23a)			0.5	(23b)
If bala	anced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (from	n Table 4h)) =				76.5	(23c)
a) If	balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	ı)m = (22	2b)m + (1	23b) × [′	ا (23c) – 1	÷ 100]	
(24a)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(24a)
b) If	balance	ed mech	anical ve	entilation	without	heat rec	overy (N	/IV) (24b)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If i	whole h f (22b)n	ouse ex n < 0.5 >	tract ver k (23b), 1	ntilation o then (24o	or positiv c) = (23b	re input v); otherv	ventilatio vise (24	on from c c) = (22b	outside b) m + 0.	5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) lf i	natural f (22b)n	ventilati n = 1, th	on or wh en (24d)	ole hous m = (22t	e positiv p)m othe	ve input erwise (2	ventilatio 4d)m = 0	on from l 0.5 + [(2	oft 2b)m² x	0.5]	•			
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effec	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Hea	at losse	s and he	eat loss	paramete	er:									
ELEN	IENT	Gro: area	ss (m²)	Openin m	gs ²	Net Ar A ,r	ea n²	U-valı W/m2	le K	A X U (W/I	<)	k-value kJ/m²·ł	e / K k	∖Xk J/K
Doors						2.1	x	1.2	=	2.52				(26)
Window	ws Type	e 1				10.43	7 x1,	/[1/(0.9)+	0.04] =	9.07				(27)
Window	ws Type	2				1.532	x1,	/[1/(0.9)+	0.04] =	1.33				(27)
Walls 7	Гуре1	51.7	12	11.97	7	39.15	; x	0.15	=	5.87				(29)
Walls 7	Гуре2	24.4	45	2.1		22.36	; x	0.14	=	3.16				(29)
Roof		35.5	51	0		35.51	x	0.12	=	4.26				(30)
Total a	rea of e	elements	s, m²			111.0	9							(31)
Party v	vall					36.91	x	0	=	0				(32)
Party fl	loor					89.7								(32a)
Party c	eiling					54.18	;				[(32b)
* for wind ** includ	dows and e the area	l roof wind as on both	lows, use e sides of ir	effective wi nternal wal	ndow U-va Is and part	alue calcul titions	ated using	formula 1,	/[(1/U-valu	ie)+0.04] a	ns given in	paragraph	3.2	
Fabric	heat los	ss, W/K	= S (A x	U)				(26)(30)	+ (32) =				26.22	(33)
Heat ca	apacity	Cm = S	(A x k)						((28)	.(30) + (32	2) + (32a).	(32e) =	10884.21	(34)
Therma	al mass	parame	eter (TM	⁻ = Cm ÷	- TFA) ir	∩ kJ/m²K			Indica	tive Value	Medium		250	(35)
For desi can be u	gn assess ised inste	sments wh ad of a de	nere the de stailed calc	tails of the ulation.	constructi	ion are not	t known pr	ecisely the	e indicative	values of	TMP in Ta	able 1f		
Therma	al bridg	es : S (L	. x Y) cal	culated u	using Ap	pendix ł	<						5.65	(36)
if details Total fa	of therma abric he	al bridging at loss	are not kr	own (36) =	= 0.05 x (3	1)			(33) +	(36) =		[31.86	(37)
Ventila	tion hea	at loss c	alculated	d monthly	/				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m=	19.98	19.76	19.54	18.45	18.23	17.14	17.14	16.92	17.57	18.23	18.67	19.1		(38)
Heat tr	ansfer o	coefficie	nt. W/K			1	1		(39)m	= (37) + (3	1 38)m			
(39)m=	51.84	51.62	51.4	50.31	50.09	49	49	48.78	49.44	50.09	50.53	50.97		
										Average =	Sum(39)1	12 /12=	50.26	(39)
Heat Ic	oss para	meter (H	HLP), W/	m²K	0.56	0.55	0.55	0.54	(40)m	= (39)m ÷	(4)	0.57		
(40)m=	0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55		0.56 Sum(40),	0.57	0.56	(40)
Numbe	er of day	s in mo	nth (Tab	le 1a)					,	worugo –	Cum(40)1		0.00	
	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	iter heat	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assum	ed occu	inancy	N								2	62		(42)
if TF	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.	9)	.02		(42)
Annua	l averag	e hot wa	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		96	6.46		(43)
Reduce not more	the annua e that 125	al average litres per l	hot water person per	usage by r dav (all w	5% if the c ater use. I	lwelling is hot and co	designed i Id)	to achieve	a water us	se target o	f			
	lan	Eob	Mar		May			Δυσ	Son	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)	Seb		NOV	Dec		
(44)m=	106.11	102.25	98.39	94.53	90.67	86.82	86.82	90.67	94.53	98.39	102.25	106.11		
										Total = Su	m(44) ₁₁₂ =	=	1157.54	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	0Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	157.35	137.62	142.01	123.81	118.8	102.52	95	109.01	110.31	128.56	140.33	152.39		_
lf instant	taneous w	ater heati	ng at point	of use (no	hot wate	r storage),	enter 0 in	boxes (46) to (61)	Total = Su	m(45) ₁₁₂ =	= [1517.71	(45)
(46)m=	23.6	20.64	21.3	18.57	17.82	15.38	14.25	16.35	16.55	19.28	21.05	22.86		(46)
Water	storage	loss:		<u> </u>							·			
Storag	e volum	e (litres)) includir	ig any so	blar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If comr Otherw	nunity n vise if no	eating a	nd no ta hot wate	ink in dw er (this ir	/elling, e Icludes i	nter 110 nstantar) litres in Deous co	(47) mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:	not mate			notantai				51 0 m (,			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	⁻ storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
b) If m Hot wa	ianufact	urer's de age loss	eclared (cylinder l com Tabl	oss fact e 2 (kW	or is not h/litre/da	known:				0	02		(51)
If comr	nunity h	eating s	ee secti	on 4.3	• = (.,	~J)				0.	.02		(0.)
Volume	e factor	from Ta	ble 2a								1.	.03		(52)
Tempe	erature fa	actor fro	m Table	2b							0	.6		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter	(50) or (54) IN (5	oulete d'	lon on all						~	1.	.03		(55)
vvater	storage	ioss cal		or each	month			((ασ)) = (ວວ) × (41)		a			
(56)m=	32.01	28.92	d solar sto	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	хН	(56)
						× ((00) = (() - () - ()		.) = (50)				A 11	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

DER WorkSheet: New dwelling design stage

Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	J	(58)
Primar	Primary circuit loss calculated for each month (59)m = (58) \div 365 × (41)m													
(mo	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	a cylinde	r thermo	ostat)		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	J	(59)
Combi	Combi loss calculated for each month (61)m = (60) \div 365 × (41)m													
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total h	neat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × 0	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	212.63	187.55	197.29	177.31	174.08	156.01	150.27	164.29	163.8	183.83	193.82	207.67		(62)
Solar DI	HW input of	calculated	using App	endix G or	r Appendix	H (negati	ve quantity	y) (enter '0	' if no sola	r contribut	ion to wate	r heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter									-		
(64)m=	212.63	187.55	197.29	177.31	174.08	156.01	150.27	164.29	163.8	183.83	193.82	207.67		
			-	-	-	-	-	Outp	out from w	ater heate	r (annual)₁	12	2168.55	(64)
Heat g	jains froi	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	n + (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	96.54	85.7	91.44	83.96	83.72	76.88	75.81	80.47	79.47	86.97	89.45	94.89		(65)
inclu	ude (57)i	m in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	vater is fr	rom com	munity h	neating	
5. In	ternal ga	ains (see	e Table 5	5 and 5a):									
Metab	olic gain	s (Table	.5) Wat	ts										
motab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(66)m=	131.08	131.08	131.08	131.08	131.08	131.08	131.08	131.08	131.08	131.08	131.08	131.08		(66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	llso see '	Table 5				1	
(67)m=	23.05	20.48	16.65	12.61	9.42	7.96	8.6	11.17	15	19.04	22.23	23.69]	(67)
Applia	nces dai	ins (calc	ulated ir	n Append	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5			1	
(68)m=	238.52	240.99	234.76	221.48	204.72	188.96	178.44	175.96	182.2	195.48	212.24	227.99		(68)
Cookir	na aains	(calcula	ted in A	ı ppendix	L. equat	tion L15	or L15a), also se	i ee Table	5			1	
(69)m=	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	1	(69)
Pumps	s and far	ns gains	(Table !	і 5а)									1	
(70)m=		0	0	0	0	0	0	0	0	0	0	0	1	(70)
Losse		anoratio	n (nega	L tive valu	L es) (Tab	L							1	
(71)m=	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	-104.86	1	(71)
Water	heating	nains (T	able 5)										I	
(72)m=	129.76	127.53	122.91	116.61	112 53	106 78	101 89	108 15	110.38	116 89	124 24	127 54	1	(72)
Total i	internal	agine -	122.01	110.01	112.00	(66)	m + (67)m	1 + (68)m -	+ (69)m + ((70)m + (7)	(1)m + (72)	m	l	``
(73)m-	453.65	yanis =	436.64	413.02	388 00	366.02	351.25	357.62	369.0	393 74	421 03	441 55	1	(73)
6_Se	lar gains	-01.02		+10.02	000.99	000.02	001.20	007.02	000.0	000.74	721.03	1.00		()
Solar o	gains are o	alculated	using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	ne applicat	ole orientat	ion.		
Orient	ation: A	Access F	actor	Area		Flu	x		a		FF		Gains	

Orientat	ion:	Table 6d		m²		Table 6a		g_ Table 6b		Table 6c		(W)	
North	0.9x	0.77	x	10.44	x	10.63	×	0.35	×	0.8] =	21.53	(74)
North	0.9x	0.77	x	10.44	x	20.32	×	0.35	×	0.8] =	41.15	(74)

North	0.9x	0.77		x	10.4	44	×	3	34.53	x	0.35	>	٢	0.8		= [69.93	(74)
North	0.9x	0.77		x	10.4	44	×	5	5.46	x	0.35		Ē	0.8		= [112.33	(74)
North	0.9x	0.77		x	10.4	44	×	7	4.72	x	0.35		Ē	0.8		= [151.31	(74)
North	0.9x	0.77		x	10.4	44	×	7	' 9.99	x	0.35	>	Ē	0.8		=	161.99	(74)
North	0.9x	0.77		x	10.4	44	×	7	4.68	x	0.35		Ē	0.8		= [151.23	(74)
North	0.9x	0.77		x	10.4	44	×	5	59.25	x	0.35	>	Ē	0.8		=	119.99	(74)
North	0.9x	0.77		x	10.4	44	×	4	1.52	x	0.35	>	Ē	0.8		= [84.08	(74)
North	0.9x	0.77		x	10.4	44	×	2	24.19	x	0.35	>	Ē	0.8		= [48.99	(74)
North	0.9x	0.77		x	10.4	44	×	1	3.12	x	0.35	>	Ē	0.8		= [26.57	(74)
North	0.9x	0.77		x	10.4	44	×		8.86	x	0.35	>		0.8		= [17.95	(74)
East	0.9x	0.77		x	1.5	3	×	1	9.64	x	0.35	>		0.8		= [5.84	(76)
East	0.9x	0.77		x	1.5	3	×	3	8.42	x	0.35	>		0.8		= [11.42	(76)
East	0.9x	0.77		x	1.5	3	×	6	3.27	x	0.35	>		0.8		= [18.81	(76)
East	0.9x	0.77		x	1.5	3	×	9	2.28	x	0.35	>		0.8		= [27.43	(76)
East	0.9x	0.77		x	1.5	3	×	1	13.09	x	0.35	>		0.8		= [33.62	(76)
East	0.9x	0.77		x	1.5	3	×	1	15.77	x	0.35	>		0.8		= [34.42	(76)
East	0.9x	0.77		x	1.5	3	×	1	10.22	x	0.35	>		0.8		= [32.76	(76)
East	0.9x	0.77		x	1.5	3	×	9	94.68	x	0.35	>		0.8		= [28.14	(76)
East	0.9x	0.77		x	1.5	3	×	7	3.59	x	0.35	>		0.8		= [21.88	(76)
East	0.9x	0.77		x	1.5	3	×	4	5.59	x	0.35	>		0.8		= [13.55	(76)
East	0.9x	0.77		x	1.5	3	×	2	24.49	x	0.35	>		0.8		= [7.28	(76)
East	0.9x	0.77		x	1.5	3	x	1	6.15	x	0.35	>		0.8		= [4.8	(76)
Solar (gains in	watts, ca		ted	for eac	n mon	th			(83)m	n = Sum(74)m	n(82)	m	1				(00)
(83)m=	27.37	52.58	88.7	74	139.76	184.9	3	196.4	184	148	.13 105.95	62.	54	33.85	22.	75		(83)
10tal ((04)III =	= (73)II		63 42	, waiis	505	75 475 96	150	20	151 00	161	24		(84)
(04)11=	461.03	503.9	525.	30	552.78	573.9	3 3	002.42	535.25	505	./5 4/5.80	430	.20	404.00	404	.31		(04)
7. Me	an inter	nal temp	peratu	ure (heating	seaso	on)		-							r		
Temp	perature	during h	neatin	g pe	eriods ir	the li	ving	area	from Tak	ole 9	, Th1 (°C)					l	21	(85)
Utilis	ation fac	tor for g	ains f	for li	ving are	ea, h1,	m (s	see Ta	ible 9a)	<u> </u>								
(22)	Jan	Feb	Ma	ar	Apr	Ma	y	Jun	Jul	A	ug Sep	0	ct	Nov	D	ec		(00)
(86)m=	1	1	0.9	9	0.94	0.79		0.56	0.4	0.4	14 0.71	0.9	15	0.99	1			(00)
Mear	interna	l temper	ature	in li	ving are	ea T1	(follo	ow ste	ps 3 to 7	7 in T	able 9c)							
(87)m=	20.55	20.61	20.7	73	20.9	20.98		21	21	2	1 20.99	20	.9	20.71	20.	54		(87)
Temp	erature	during h	eatin	ig pe	eriods ir	n rest o	of dv	velling	from Ta	able 9	9, Th2 (°C)							
(88)m=	20.45	20.45	20.4	45	20.47	20.47	· _ :	20.48	20.48	20.	48 20.47	20.	47	20.46	20.4	46		(88)
Utilis	ation fac	tor for g	ains f	for re	est of d	welling	, h2	,m (se	e Table	9a)								
(89)m=	1	0.99	0.9	8	0.92	0.75		0.51	0.36	0.3	39 0.66	0.9	3	0.99	1			(89)
Mear	interna	l temper	ature	in t	he rest	of dwe	elling) T2 (f	ollow ste	eps 3	to 7 in Ta	ble 9c)					
(90)m=	19.84	19.94	20.1	1	20.34	20.45		20.48	20.48	20.	48 20.47	20.	35	20.08	19.8	83		(90)
										_		fLA =	Livir	ng area ÷ (4	4) =		0.39	(91)

Mean	internal	temper	ature (fo	r the wh	ole dwel	ling) = fl	LA x T1	+ (1 – fL	A) × T2					
(92)m=	20.11	20.2	20.35	20.56	20.66	20.68	20.68	20.68	20.67	20.56	20.32	20.11		(92)
Apply	adjustr	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate		·		
(93)m=	20.11	20.2	20.35	20.56	20.66	20.68	20.68	20.68	20.67	20.56	20.32	20.11		(93)
8. Spa	ace heat	ting requ	urement							• T : /'	70)			
the ut	ilisation	factor fo	ernal ter or gains (nperatur using Ta	e obtain ble 9a	ed at ste	epitor	Table 9	o, so tha	t 11,m=(76)m an	a re-caic	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.98	0.93	0.76	0.53	0.37	0.41	0.68	0.94	0.99	1		(94)
Usefu	l gains,	hmGm	, W = (94	4)m x (84	4)m									(05)
(95)m=	479.39	500.73	516.23	512.39	437.87	297.54	199.9	208.81	322.02	428.03	450.59	463.09		(95)
				perature		14 6	16.6	16.4	14.1	10.6	7 1	42		(96)
Heat	oss rate	e for me	an intern	al tempe	erature.	_m . W =	=[(39)m ;	x [(93)m	(96)m	1	/.1	7.2		()
(97)m=	819.72	789.69	712.02	586.44	448.67	297.88	199.91	208.84	324.94	499.03	668.03	810.64		(97)
Space	e heating	g require	ement fo	r each m	nonth, k\	Vh/mont	th = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m			
(98)m=	253.21	194.18	145.67	53.32	8.04	0	0	0	0	52.83	156.55	258.58		
								Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	1122.37	(98)
Space	e heating	g require	ement in	kWh/m²	/year								12.51	(99)
9b. En	ergy req	uiremer	nts – Cor	nmunity	heating	scheme								
This pa	art is use	ed for sp	ace hea	ting, spa	ace cooli	ng or wa	ater heat	ing prov	ided by	a comm	unity sch	neme.		-
Fractio	n of spa	ice heat	from se	condary/	suppler	nentary r	neating (I able 1	1) '0' if n	one			0	(301)
Fractio	n of spa	ice heat	from co	mmunity	system	1 – (301	1) =						1	(302)
The com	munity sc	heme mag	y obtain he	eat from se	everal sour	ces. The p	procedure	allows for	CHP and ι ndix C	up to four (other heat	sources; tl	he latter	
Fractio	n of hea	at from C	Commun	ity heat p	oump	on power	stations.	See Appel	IUIX C.				1	(303a)
Fractio	n of tota	al space	heat fro	m Comm	nunity he	eat pump	D			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating syst	tem			1	(305)
Distribu	ution los	s factor	(Table 1	2c) for c	ommuni	ity heatir	ng syste	m					1.05	(306)
Space	heating	3										I	kWh/year	
Annual	space l	heating	requirem	nent									1122.37	7
Space	heat fro	m Comr	munity h	eat pum	p				(98) x (30	04a) x (30	5) x (306) =	=	1178.49	(307a)
Efficier	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment froi	m secon	dary/sup	plemen	tary syst	em	(98) x (30	01) x 100 -	+ (308) =	ĺ	0	(309)
Water	heating	ļ												_
Annual	water h	neating r	equirem	ent									2168.55	
If DHW Water	/ from co heat froi	ommuni m Comr	ty schem nunity he	ne: eat pump)				(64) x (30)3a) x (30	5) x (306) =	-	2276.98	(310a)
Electric	city used	l for hea	at distribu	ution				0.01	× [(307a).	(307e) +	(310a)([310e)] =	34.55	(313)
Cooling	g Syster	n Energ	y Efficiei	ncy Ratio	C								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g system	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)

DER WorkSheet: New dwelling design stage

Electricity for pumps and fans within dv mechanical ventilation - balanced, extra	velling (Table 4f): act or positive input fror	n outside		218.89	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =	218.89	(331)
Energy for lighting (calculated in Apper	ndix L)			407.13	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-508.01	(333)
Total delivered energy for all uses (307	7) + (309) + (310) + (312	2) + (315) + (331) + (33	82)(237b) =	3573.48	(338)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	water heating (not CHP If there is CHP usi) ing two fuels repeat (363) to	(366) for the second fu	el 400	(367a)
CO2 associated with heat source 1	[(307b))+(310b)] x 100 ÷ (367b) x	0.52	= 448.35	(367)
Electrical energy for heat distribution		[(313) x	0.52	= 17.93	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(372	2)	= 466.28	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	= 0	(374)
CO2 associated with water from immer	sion heater or instantar	neous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and w	vater heating	(373) + (374) + (375) =		466.28	(376)
CO2 associated with electricity for pum	ps and fans within dwe	lling (331)) x	0.52	= 113.6	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	= 211.3	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appli	cable	0.52 × 0.01 =	-263.66	(380)
Total CO2, kg/year	sum of (376)(382) =			527.53	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			5.88	(384)
El rating (section 14)				94.75	(385)

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Documen Printed on 03 Augus	nt L1A, 2013 Edition, st 2022 at 12:29:07	, England assessed by Strom	a FSAP 2012 program, Ver	rsion: 1.0.5.16
Assessed By:	Robyn Berry (STR	D036659)	Building Type:	Flat
Dwelling Details:			Dunung Type.	
NEW DWELLING D			Total Floor Area: 9	2.67m²
Site Reference ·	BP Finchley Road		Plot Reference:	G04 BP Finchley Rd
Address :	CO4 DD Finables D	d London NIM/2 EEV	r lot Nelerence.	OUT DI TINCINEY INU
Address :	G04 BP FINCHIEV R	a, London, NVV3 5E f		
Client Details:				
Name: Address :				
This report covers It is not a complete	items included with report of regulation	thin the SAP calculations. ons compliance.		
1a TER and DER	· -			
Fuel for main heatin Fuel factor: 1.55 (ele Target Carbon Diox Dwelling Carbon Dio 1b TEEE and DEE	ng system: Electricity ectricity (c)) ide Emission Rate (oxide Emission Rate	/ (c) TER) ∌ (DER)	23.5 kg/m² 5.75 kg/m²	ОК
Target Fabric Energy	v Efficiency (TEEE)		46.4 kW/b/m²	
Dwelling Fabric Ene	ergy Efficiency (DFE	E)	33.4 kWh/m²	
0		,		ОК
2 Fabric U-values	:			
Element		Average	Highest	
External w	all	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall		0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	ÜK
Openings		(101001) 0.93 (max 2.00)	1 20 (max .3.30)	ОК
2a Thermal bridgi	ina	0.00 (max: 2.00)	1.20 (max. 0.00)	UN
Thermal br	ridging calculated fro	om linear thermal transmittan	ces for each junction	
3 Air permeability	/			
Air permeabi	lity at 50 pascals		3.00 (design valu	ue)
Maximum			10.0	OK
4 Heating efficien	су			
Main Heating	g system:	Community heating scheme	es - Heat pump	
Secondary h	eating system:	None		
5 Cylinder insulat	tion			
Hot water Sto	orage:	No cylinder		
6 Controls				
Space heatin Hot water co	ng controls ntrols:	Charging system linked to u No cylinder thermostat No cylinder	ise of community heating, p	rogrammer and TRVs OK
Enforcement bodies must refer to and verify separate SAP Specification Document before using this reporting for compliance

Regulations Compliance Report Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights			
	Percentage of fixed lights with low-energy fittings	100.0%	
	Minimum	75.0%	OK
8 Mechanical ventilation			
	Continuous supply and extract system		
	Specific fan power:	0.63	
	Maximum	1.5	OK
	MVHR efficiency:	90%	
	Minimum	70%	ОК
9 S	summertime temperature		
	Overheating risk (Thames valley):	Medium	ОК
Base	ed on:		
	Overshading:	Average or unknown	
	Windows facing: South West	3.58m ²	
	Windows facing: West	7.18m ²	
	Windows facing: North	3.1m ²	
	Windows facing: South	3.1m ²	
	Windows facing: North West	3.38m ²	
	Ventilation rate:	2.00	
	Blinds/curtains:	None	
10	Key features		
	Thermal bridging	0.025 W/m²K	
	Air permeablility	3.0 m³/m²h	
	Windows U-value	0.9 W/m²K	
	Party Walls U-value	0 W/m²K	
	Floors U-value	0.1 W/m²K	
	Community heating, heat from electric heat pump		
	Photovoltaic array		