DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STRO036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: G05 BP Finchley Rd.Address :G05 BP Finchley Rd, London, NW3 5EYAddress :G05 BP Finchley Rd, London, NW3 5EYI. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor99.23(1a) x 2.54 (2a) = 252.04 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)99.23(4)Eating 252.04 (5)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 252.04 (5)Number of chimneys0+0=0x 40 =0I. O0+0=0x 40 =0(6a)
Property 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) x 2.54 (2a) = 252.04 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)99.23(4)(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04 (5)2. Ventilation rate:mainsecondaryothertotalmainmainsecondaryothertotalmainmainmainsecondaryothertotalmainmainmainsecondaryothertotalmainsecondaryothertotalmainsecondaryothertotalmainsecondaryothertotalmainsecondaryothertotalmainsecondaryothertotalmainmainsecondaryothertotalmainmainsecondaryothertotal
Address : G05 BP Finchley Rd, London, NW3 5EY 1. Overall dwelling dimensions: Area(m ²) Av. Height(m) Volume(m ³) Ground floor 99.23 $(1a) \times$ 2.54 $(2a) =$ 252.04 $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 99.23 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 252.04 (5) Dwelling volume volume volume 2. Ventilation rate: main secondary heating Main floor volume volume
1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 99.23 $(1a) \times 2.54$ $(2a) = 252.04$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 99.23 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04$ (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04$ (5) 2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hour
Area(m²)Av. Height(m)Volume(m³)Ground floor 99.23 $(1a) \times 2.54$ $(2a) = 252.04$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 99.23 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04$ (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04$ (5) 2. Ventilation rate: m^3 per hour
Ground floor Ground floor Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04 (5) 2. Ventilation rate: main secondary heating Number of this product of the second s
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 252.04$ (5) 2. Ventilation rate: main heating secondary other total m ³ per hour heating heating to the second s
2. Ventilation rate: main secondary other total m ³ per hour heating heating 1
main secondary other total m ³ per hour heating heating
heating heating
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 $0 \times 10 = 0$ (7a)
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)
Number of storeys in the dwelling (ns)0Additional infiltration (9) (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction
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 0 (13)
Percentage of windows and doors draught stripped 0 (14)Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0
$\frac{1}{10} + \frac{1}{10} $
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 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)
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

Adjusted 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		
Calculate effect		•	rate for ti	he appli	cable ca	se	-					0.5	(23a)
If exhaust air he			endix N. (2	3b) = (23a	i) x Fmv (e	equation (N	(5)) othe	wise (23b) = (23a)			0.5	(23a)
If balanced with) = (200)			0.5	
a) If balance				0		,			2h)m ± (23h) v [1 _ (23c)	76.5 ÷ 1001	(23c)
(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	÷ 100]	(24a)
b) If balance											0.20		
(24b)m= 0			0	0				0		0	0		(24b)
c) If whole h		tract ven	tilation c	or positiv	e input v	/entilatio	n from c	utside					
if (22b)m				•	•				.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural v if (22b)m					•				0.5]	•	•		
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)		-	-		
(25)m= 0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(25)
3. Heat losses	s and he	at loss r	haramete	ەد.								•	
ELEMENT	Gros	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²·ł		A X k kJ/K
Doors		()			2.1	x	1.2		2.52				(26)
Windows Type	1				14.75	8 x1/	L/[1/(0.9)+	0.04] =	12.82	╡			(27)
Windows Type					1.667	-	/[1/(0.9)+		1.45	\exists			(27)
Floor					99.22		0.1		9.9228			- —	(28)
Walls Type1	46.2	24	16.43	5	29.81		0.15		4.47			\dashv	(29)
Walls Type2	61		2.1	<u>, </u>	58.9		0.13		8.33			\dashv	(29)
Total area of e	L		2.1				0.14		0.33	L			
	lemento	,			206.4				-	— , r			(31)
Party wall					22.69		0	=	0			\dashv	(32)
Party ceiling * for windows and	roofwind		ffootivowi	adow II. ve	99.23		formula 1	/[/1/11.00	(a) = 0.041		norograph		(32b)
** include the area						aleu using	Tornula I	/[(1/ 0- vait	ie)+0.04j c	is given in	parayrapri	5.2	
Fabric heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				39.52	(33)
Heat capacity (Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	16762.62	2 (34)
Thermal mass	parame	ter (TMF	P = Cm ÷	TFA) in	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assess can be used instea				constructi	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated u	ising Ap	pendix k	<						6.56	(36)
if details of therma		are not kn	own (36) =	: 0.05 x (3	1)			(0.0)	(0.0)				
Total fabric hea									(36) =			46.07	(37)
Ventilation hea		i			1	11	Λ		$= 0.33 \times ($	1	i	l	
(38)m= 22.1	Feb 21.86	Mar 21.62	Apr 20.41	May 20.17	Jun 18.96	Jul 18.96	Aug 18.72	Sep 19.44	Oct 20.17	Nov 20.65	Dec 21.13		(38)
			20.41	20.17	10.00	10.30	10.72				21.13		(00)
Heat transfer c (39)m= 68.17	67.93		66.48	66.24	65.03	65.03	64.79	(39)m 65.52	= (37) + (3 66.24	38)m 66.72	67.21	l	
		67.69					04.79		Average =			66 48-	ige 2 of ³⁹⁾
Stroma FSAP 201	∠ version:	. 1.0.5.10 (JAP 9.92)	- mp://ww	ww.suoma							1 <u>2014</u> 8	$y \in \mathbb{Z} \oplus \mathbb{Z}^{n}$

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	.9, N = 1		[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	al average	hot water	usage by	5% if the a	lwelling is	designed t			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		
Energy content of	of hot wator	used cal	culated m	opthly - 1	100 v Vd r	n v nm v F)Tm / 2600			m(44) ₁₁₂ =		1189.1	(44)
(45)m= 161.64	141.38	145.89	127.19	122.04	105.31	97.59	111.98	113.32	132.06	144.16 m(45) ₁₁₂ =	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,		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													
Storage volur	. ,					-		ame vess	sei	()		(47)
If community Otherwise if r	o stored			•			· · ·	ers) ente	er '0' in (47)			
Water storage a) If manufac		eclared I	oss facto	or is kno	wn (kWł	n/dav).					<u> </u>		(48)
Temperature						", ddy).)		(49)
Energy lost fr				ear			(48) x (49)) =		11	-		(50)
b) If manufac		-	•		or is not		. , . ,						(00)
Hot water sto	-			e 2 (kW	h/litre/da	ıy)				0.	02		(51)
If community Volume factor	•		on 4.3							1.0	02	l	(52)
Temperature			2b							0.			(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 circu						, ,	• •						
(modified b	1	i	i	1				-		· · · · ·	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		(59)

Combi	loss ca	alculated	for eac	h month	(61)m =	(60) ÷ 36	65 × (41))m							
(61)m=	0	0	0	0	0		0	0	0		0	0	0	0]	(61)
Total h	eat rec	uired for	water h	neating ca	alculated	l fo	r eacl	h month	(62)	m =	0.85 × ((45)m +	· (46)m +	(57)m	_ + (59)m + (61)m	
(62)m=	216.92	191.3	201.16	180.68	177.32	1	58.8	152.86	167	.26	166.81	187.34	197.65	211.82	7	(62)
Solar DI	-IW input	calculated	using Ap	pendix G o	r Appendix	(Н (negati	ve quantity	/) (ent	er '0'	' if no sola	r contribu	ition to wate	er heating	3)	
(add a	dditiona	al lines if	FGHRS	S and/or V	WWHRS	s ap	plies	, see Ap	pend	lix G	G)					
(63)m=	0	0	0	0	0		0	0	0		0	0	0	0		(63)
Output	from w	vater hea	ter		-			-			-			-		
(64)m=	216.92	191.3	201.16	180.68	177.32	1	58.8	152.86	167	.26	166.81	187.34	197.65	211.82	7	
										Outp	out from wa	ater heat	er (annual)	112	2209.93	(64)
Heat g	ains fro	om water	heating	, kWh/m	onth 0.2	5 ′	[0.85	× (45)m	+ (6	1)m	n] + 0.8 >	(46)m	n + (57)m	+ (59)	n]	
(65)m=	97.97	86.95	92.73	85.08	84.8	7	7.81	76.67	81.4	46	80.47	88.13	90.73	96.27	7	(65)
inclu	ide (57))m in calo	culation	of (65)m	only if c	ylir	nder is	s in the c	dwell	ing	or hot w	ater is	from com	munity	_ heating	
5. Int	ternal g	ains (see	e Table	5 and 5a):											
Metab	olic gai	ns (Table	e 5). Wa	itts	, 											
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	Jg	Sep	Oct	Nov	Dec	7	
(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	1	(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion	L9 o	r L9a), a	lso s	ee ⁻	Table 5					
(67)m=	23.57	20.93	17.02	12.89	9.63	1	3.13	8.79	11.4		15.33	19.47	22.72	24.22	7	(67)
Applia	nces da	ains (calc	ulated i	n Appen	dix L. ea	uat	ion L	13 or L1	3a). a	also	see Ta	ble 5				
(68)m=	255.07	· ·	251.05	236.85	218.93	r –	02.08	190.83	188		194.85	209.05	226.97	243.82	7	(68)
		s (calcula										5				
(69)m=	36.66	36.66	36.66	36.66	36.66	-	6.66	36.66	36.0		36.66	36.66	36.66	36.66	7	(69)
		I Ins gains														
(70)m=					0		0	0	0		0	0	0	0	7	(70)
		vaporatic	_				-	ů			Ů	Ů				
	•	-109.29	· •		, ,		,	-109 29	-109	29	-109 29	-109 29	-109.29	-109.29	7	(71)
		gains (1			100.20		50.20	100.20	100	.20	100.20	100.20	100.20	100.20		(,
(72)m=	131.68	, , ,	124.64	118.17	113.98	1	08.07	103.05	109	18	111.77	118.46	126.01	129.4	7	(72)
				1110.17	110.00								71)m + (72			()
(73)m=	474.3	I gains = 472.03	456.69	431.9	406.52	20	32.27	366.65	373	<i>'</i>	385.93	410.96	1	461.43	7	(73)
. ,	lar gain		450.09	431.9	400.52	50	52.21	300.03	575	.07	303.93	410.90	439.09	401.40		(10)
		calculated	usina soli	ar flux from	Table 6a	and	associ	iated equa	tions	to co	onvert to th	e applica	ble orienta	tion.		
-		Access F	•	Area			Flu				g_	o appilo	FF		Gains	
•		Table 6d		m²				ole 6a		Т	able 6b	-	Table 6c		(W)	
North	0.9x	0.77	>	14.	76	x	1	0.63	x		0.35	ר × ר	0.8		30.45	(74)
North	0.9x	0.77	,			x		20.32	x		0.35		0.8	╡_		(74)
North	0.9x	0.77				x		4.53	x		0.35		0.8	-		(74)
North	0.9x	0.77				x		5.46	x		0.35	^ L 	0.8	╡_	00.00](74)
North	0.9x	0.77	^ ^			x		4.72	x		0.35		0.8	=		(74)
	0.04	0.77	^	· 14.	10	^	1	7.12	^		0.55	^ L	0.0		213.90	

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

		,			1				-			,					
North	0.9x	0.77		x	14.7	6	x	7	9.99	×	0.35	×	0.8		=	229.05	(74)
North	0.9x	0.77		x	14.7	6	x	7	4.68	x	0.35	×	0.8		=	213.85	(74)
North	0.9x	0.77		x	14.7	6	x	5	9.25	×	0.35	×	0.8		=	169.66	(74)
North	0.9x	0.77		x	14.7	6	x	4	1.52	x	0.35	×	0.8		=	118.89	(74)
North	0.9x	0.77		x	14.7	6	x	2	4.19	x	0.35	x	0.8		=	69.27	(74)
North	0.9x	0.77		x	14.7	6	x	1	3.12	x	0.35	×	0.8		=	37.56	(74)
North	0.9x	0.77		x	14.7	6	x	5	3.86	x	0.35	x	0.8		=	25.38	(74)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	1	1.28	x	0.35	x	0.8		=	3.65	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	2	2.97	x	0.35	x	0.8		=	7.43	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	4	1.38	x	0.35	x	0.8		=	13.38	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	6	7.96	x	0.35	x	0.8		=	21.98	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	g	1.35	x	0.35	x	0.8		=	29.55	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	g	7.38	x	0.35	x	0.8		=	31.5	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	9	91.1	x	0.35	x	0.8		=	29.47	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	7	2.63	x	0.35	x	0.8		=	23.49	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	5	0.42	x	0.35	x	0.8		=	16.31	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	2	8.07	x	0.35	x	0.8		=	9.08	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x		14.2	x	0.35	x	0.8		=	4.59	(81)
Northwe	st <mark>0.9x</mark>	0.77		x	1.67	7	x	9	9.21	x	0.35	x	0.8		=	2.98	(81)
(83)m=	34.1	watts, ca 65.62 nternal a	112.27	'	180.81	243.51	2	260.55 (83)m	243.31	<mark>(83)m</mark> 193	a = Sum(74)m . .15 135.2	(<mark>82)</mark> m 78.3	-	28.	37		(83)
(84)m=	508.4	537.65	568.96	;	612.71	650.03	6	642.82	609.96	566	.22 521.13	489.3	481.85	489	.79		(84)
7. Mea	an inter	nal temp	eratur	e (heating	seaso	n)										
Tempe	erature	during h	eating	pe	eriods in	the liv	ving	area	from Tab	ole 9	Th1 (°C)					21	(85)
Utilisat	tion fac	tor for g	ains fo	r li	ving area	a, h1,r	n (s	see Ta	ble 9a)								
	Jan	Feb	Mar		Apr	May	′	Jun	Jul	A	ug Sep	Oc	t Nov	D	ec		
(86)m=	1	1	0.99		0.97	0.86		0.64	0.47	0.5	62 0.82	0.98	1	1			(86)
Mean	interna	l temper	ature i	n li	ving are	a T1 (follo	ow ste	ps 3 to 7	7 in T	able 9c)						
(87)m=	20.35	20.42	20.57		20.78	20.94		21	21	2	1 20.97	20.7	3 20.54	20.	34		(87)

Temp	erature	during h	leating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	n2 (°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, l	n2,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	ps 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	1) =	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	20.63	20.61	20.38	20.07	19.81	(92)

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

Results and in	puis inic	nnieu by	ruevelop			Any dev	auonis	Certain to	5 output	umeren	i resuits.		
(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. Space hea													
Set Ti to the the utilisation			•		ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac			· ·		••••	••••	1.0.9				200		
(94)m= 1	1	0.99	0.96	0.84	0.61	0.43	0.48	0.78	0.97	1	1		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	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)
Monthly aver	age exte	rnal tem	perature	e from T	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	i	i	· · ·	1	1	1 /	1 / /	<u>, </u>	ř				(07)
	1020.45	921.12	763.15	587.51	392.07	262.24	274.29	426.22	648.02	865.44	1049.43		(97)
Space heatin	g require 325.63	265.86	126.15	100 10 10 10 10 10 10 10 10 10 10 10 10	vvn/mon	th = 0.02	24 x [(97)m – (95 0)m] x (4 128.53	1)m 277.72	416.87		
(98)m= 409.83	320.03	200.00	120.15	31.00	0	0	-			r) = Sum(9		1982.27	(98)
o							TOLA	i per year	(kvvn/yeal	r) = Sum(9	O) 15,912 =		
Space heatin	g require	ement in	kWh/m ²	² /year								19.98	(99)
9b. Energy rec													
This part is use	•		• •		-		• •	•		unity scł	neme.	0	(301)
Fraction of spa						•		1) 0 11 11	one			0	
Fraction of spa	ace heat	from co	mmunity	[,] system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; ti	he latter	
includes boilers, h Fraction of hea		-			nom powe	1 Stations.	See Appe	IUIX C.				1	(303a)
Fraction of tota					eat pumi	D			(3	02) x (303	a) =	1	(304a)
Factor for cont							unitv hea	atina svs			<i>`</i>	1	(305)
Distribution los					,		-					1.05	(306)
Space heating			20) 101 0	Johnman	inty fiolad	ng oyoto					l	kWh/yea	
Annual space	-	requirem	nent									1982.27	T
Space heat fro	om Comr	nunity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	2081.38	(307a)
Efficiency 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	idary/su	pplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating Annual water h		equirem	ent									2209.93	
If DHW from c Water heat fro				þ				(64) x (30	03a) x (30	5) x (306) :	=	2320.43	(310a)
Electricity used	d for hea	t distribu	ution				0.01	× [(307a).	(307e) +	- (310a)((310e)] =	44.02	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g syster	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
						,							
Electricity for p	oumps a	nd fans v	within dv	vellina (*	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) =		242.15	(331)
Energy for lighting (calculated in Append	dix L)				416.24	(332)
Total delivered energy for all uses (307)	+ (309) + (310)	+ (312) + (315) + (331) + (332	2)(237b) =		5060.2	(338)
12b. CO2 Emissions – Community heat	ing scheme					_
		Energy kWh/year	Emission fac kg CO2/kWh		nissions g CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)		ot CHP) CHP using two fuels repeat (363) to (366) for the secon	d fuel	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 s	ystems	(363)(366) + (368)(372))	=	593.98	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	ion heater or in	stantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			593.98	(376)
CO2 associated with electricity for pump	os and fans with	in dwelling (331)) x	0.52	=	125.67	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52	=	216.03	(379)
Total CO2, kg/year	sum of (376)(38	2) =			935.68	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				9.43	(384)
El rating (section 14)					91.31	(385)

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

Project Informat	ion:			
sessed By:	Robyn Berry (S1	RO036659)	Building Type:	Flat
welling Details	:			
	B DESIGN STAGE		Total Floor Area: 7	2.1m²
te Reference :	BP Finchley Roa	ad	Plot Reference:	405 BP Finchley Rd
ddress :	405 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame:				
ddress :				
his report cove	ers items included	within the SAP calculations.		
•		ations compliance.		
a TER and DE	R			
uel for main hea	ating system: Electri	city (c)		
uel factor: 1.55	• • • • • • • • • • • • • • • • • • • •			
-	ioxide Emission Rat		27.5 kg/m ²	
	Dioxide Emission R	ate (DER)	10.35 kg/m²	OK
b TFEE and D	FEE ergy Efficiency (TFE	E)	53.2 kWh/m²	
-	Energy Efficiency (D		40.6 kWh/m²	
)		ОК
2 Fabric U-valu	es			
Elemen	t	Average	Highest	
External	wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		(no floor)	0.40 (OK
Roof	10	0.12 (max. 0.20) 0.94 (max. 2.00)	0.12 (max. 0.35) 1.20 (max. 3.30)	OK OK
Opening a Thermal brid	-	0.94 (max. 2.00)	1.20 (IIIax. 5.50)	UK
	00	from linear thermal transmittan	cos for oach junction	
Air permeabil				
-	ability at 50 pascals		3.00 (design valu	ue)
Maximum	<i>y</i> 1		10.0	ÓK
Heating effici	encv			
	ing system:	Community heating scheme	es - Heat pump	
	J J J	,	1 * 1	
Secondary	/ heating system:	None		
i Cylinder insu	lation			
Hot water		No cylinder		
Controls	iting controls	Charging system linked to u	ise of community heating in	rogrammer and TRVsOK
6 Controls	ating controls controls:	Charging system linked to u No cylinder thermostat	use 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%	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	

0 W/m²K

Party Walls U-value

Community heating, heat from electric heat pump

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

roject Informat	ion:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details				
	B DESIGN STAGE		Total Floor Area: 4	9.6m²
ite Reference :	BP Finchley Roa	d	Plot Reference:	103 BP Finchley Rd
ddress :	103 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame:				
ddress :				
his report cove	ers items included	within the SAP calculations.		
is not a compl	ete report of regula	ations compliance.		
1a TER and DE	R			
	ating system: Electric	city (c)		
uel factor: 1.55			04.001 - (
-	oxide Emission Rate	. ,	24.96 kg/m ²	OK
1b TFEE and D	Dioxide Emission R	ate (DER)	9.93 kg/m ²	OK
	ergy Efficiency (TFE	E)	34.9 kWh/m²	
-	Energy Efficiency (D		28.5 kWh/m ²	
	,,, (,		ОК
2 Fabric U-valu	es			
Elemen	t	Average	Highest	
External	wall	0.14 (max. 0.30)	0.15 (max. 0.70)	ОК
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		(no floor)		
Roof		(no roof)		
Opening	,	0.95 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal brid		for a l'according to a second	and for a set in setting	
3 Air permeabil		from linear thermal transmittan	ces for each junction	
-	ability at 50 pascals		3.00 (design valu	
Maximum	ionity at 50 pascais		10.0	OK
4 Heating effici	0001			
	ing system:	Community heating scheme	e - Heat nump	
iviali i ieat	ing system.	Community nearing scheme	s - near pump	
Secondary	heating system:	None		
5 Cylinder insu	lation			
Hot water		No cylinder		
6 Con <u>trols</u>				
6 Controls				
	ting controls	Charging system linked to u	ise of community heating, p	rogrammer and TRVs OK
	ating controls controls:	Charging system linked to u No cylinder thermostat	ise 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 rolle	er blind
	Closed 100% of daylight hour	rs
10 Key features		
Air permeablility	3.0 m³/m²h	
Windows U-value	0.9 W/m²K	
Party Walls U-value	0 W/m²K	

Stroma FSAP 2012 Version: 1.0.5.16 (SAP 9.92) - http://www.stroma.com

Community heating, heat from electric heat pump

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STRO036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: 306 BP Finchley RdAddress :306 BP Finchley Rd, London, NW3 5EY Area(m?) Av. Height(m)Volume(m?)Ground floor89.7(1a) x2.54(2a) =227.83(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)89.7(1a) x2.54(2a) =227.83(3a)Mealing volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =227.83(5a)Vertilation rate:mainsecondarymainmain(a)Number of chimneys0+0=0x40 =(6a)Number of open flues0+0=0(7a)Number of passive vents0x10 =0(7b)Number of flueless gas fires0x40 =0(7c)Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b) =0+ (5) =(a)Number of storeys in the dwelling (ns)(a)(a)(a)(a)Additional infiltration((a)((b)+(7a)+(7b)) =0((b)Number of storeys in the dwelling (ns)((b)+(7a)+(7b)+(7c) =0((b)Additional infiltration((b)+100.1 =0(10)Structural infiltration:0.25 for steel or timber frame or 0.35 for masonry construction((b)+100.1 =0(10)If bot types of wall are present, use the value c
Property Address: 306 BP Finchley RdAddress :306 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m³)Av. Height(m)Volume(m³)Ground floor 83.7 (1a) x 2.54 (2a) = 227.83 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 89.7 (4) 89.7 (4) 227.83 (5)Owelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 227.83 (5)Number of chimneys 0 + 0 = 0 × 40 = 0 (6a)Number of open flues 0 + 0 = 0 × 10 = 0 (6b)Number of intermittent fans 0 × 10 = 0 (7a)Number of flueless gas fires 0 × 40 = 0 (7c)Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 × 40 = 0 (7c)Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 × 40 = 0 (7c)Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 (9) (9) Additional infiltration $(9)-1)x0.1 =$ 0 (9)Number of storeys in the dwelling (ns) $(9)-1)x0.1 =$ 0 (10)Structural infiltration:0.25 for stele or timber frame or 0.35 for masonry construction (9) if both types of well are present, use the value corresponding to the greater wall area (after
Address :306 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m²)Ground floor89.7(1a) x2.54(2a) =227.83(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)89.7(4)Volume(m²)(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =227.83(5)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =227.83(5)(5)(6a)Number of chinneys0+0=0x 40 =0(6a)Number of open flues0+0=0x 10 =0(7a)Number of intermittent fans0x 10 =0(7a)(7b)Number of flueless gas fires0x 10 =0(7c)Air changes per hourInfiltration due to chinneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =0+ (5) =0(6)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)(9)(9)(9)(10)Number of storeys in the dwelling (ns)(9)-1(x0.1 =0(10)(11)0(11)O(9)-1(x0.1 =0(10)(11)0(11)(11)Structural infiltration(25 for stele or timber frame or 0.35 for masonry construction(11)0(11)If both types of wall are present, use the value corresponding to the greater wall area (after0(11)
Area(m ²)Av. Height(m)Volume(m ³)Ground floor 89.7 $(1a) \times 2.54$ $(2a) = 227.83$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 89.7 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 227.83$ (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 227.83$ (5) 2 (a)
Area(m²)Av. Height(m)Volume(m³)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) 89.7 (4) 89.7 (4)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 227.83 (5) 2. Ventilation rate: ***********************************
Ground floor 39.7 $(1a) \times 2.54$ $(2a) = 227.83$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 39.7 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 227.83$ (5) 2. Ventilation rate: $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 227.83$ (5) Number of chimneys 0 $+$ 0 $=$ 0 Number of open flues 0 $+$ 0 $=$ 0 $x40 =$ 0 Number of intermittent fans 0 $x10 =$ 0 $(7a)$ Number of flueless gas fires 0 $x10 =$ 0 $(7c)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $x(6) =$ 0 Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $x(6) =$ 0 Infiltration $(9)-1]x0.1 =$ 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 0 (11)
Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) =$ 227.83 (5) 2. Ventilation rate: main heating 0 secondary 0 other 0 totalm³ per hour 0 Number of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $x20 =$ 0 (6b)Number of intermittent fans 0 $x10 =$ 0 (7a)Number of passive vents 0 $x10 =$ 0 (7b)Number of flueless gas fires 0 $x40 =$ 0 (7c)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) 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 construction 0 (11)if both types of wall are present, use the value corresponding to the greater wall area (after 0 (11)
2. Ventilation rate:Number of chimneys 0 + 0 = 0 x 40 = 0 (6a)Number of open flues 0 + 0 = 0 x 40 = 0 (6a)Number of open flues 0 + 0 = 0 x 20 = 0 (6b)Number of intermittent fans 0 + 0 = 0 x 10 = 0 (7a)Number of passive vents 0 x 10 = 0 (7b) x 0 x 40 = 0 (7c)Number of flueless gas fires 0 x 40 = 0 (7c) x 40 0 (7c)Infiltration 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)(10)Additional infiltration $(9)-1$ 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 0 (11)
main heatingsecondary heatingothertotalm³ per hourNumber of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 $(6a)$ Number of open flues 0 $+$ 0 $=$ 0 $x20 =$ 0 $(6b)$ Number of intermittent fans 0 $+$ 0 $=$ 0 $x10 =$ 0 $(7a)$ Number of passive vents 0 $x10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $x40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $+$ $(5) =$ 0 (8) If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) 0 (9) (9) Number of storeys in the dwelling (ns) 0 (9) (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 0 (11)
heatingheatingNumber of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $x20 =$ 0 (6b)Number of intermittent fans 0 $x10 =$ 0 (7a)Number of passive vents 0 $x10 =$ 0 (7b)Number of flueless gas fires 0 $x40 =$ 0 (7c)Air changes per hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (5) = 0 Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (5) = 0 Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (5) = 0 Infiltration flue to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 \div (5) = 0 Number of storeys in the dwelling (ns) 0 (10) (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 0 (11)
Number of open flues 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 = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $+$ $(5) =$ 0 Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $+$ $(5) =$ 0 Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $+$ $(5) =$ 0 Number of storeys in the dwelling (ns) $4d$ 0 (9) (9) Additional infiltration (9) (10) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 0 (11) <i>it both types of wall are present, use the value corresponding to the greater wall area (after</i> 0 (11)
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 hourInfiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $\div (5) =$ 0 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) (10) 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 0 (11)
Number of passive vents 0 $x 10 =$ 0 (7) 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) (10) Additional infiltration $(9)-1]x0.1 =$ 0 (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after 0 (11)
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)Number of storeys in the dwelling (ns) 0 $9)$ Additional infiltration $[(9)-1] \times 0.1 =$ 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
Air changes per hourInfiltration 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) $\circ (9)$ (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 (after0(11)
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(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)if both types of wall are present, use the value corresponding to the greater wall area (after0(11)
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(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)if both types of wall are present, use the value corresponding to the greater wall area (after0(11)
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 (10) Additional infiltration 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 0 (11)
Number of storeys in the dwelling (ns) 0 (9) Additional infiltration 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 0 (11)
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 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 0 (11)
if both types of wall are present, use the value corresponding to the greater wall area (after
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0 0 (13)
Percentage of windows and doors draught stripped 0 (14)Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0
$\frac{1}{1} = \frac{1}{1} = \frac{1}$
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 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)
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

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		
		c <i>tive air</i> al ventila	-	rate for t	he appli	cable ca	se					I	0.5	(23a)
				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 + (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)
,				ntilation o then (24o	•	•				5 × (23b))			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,				ole hous m = (22t						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		Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²·ł		∖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)
				effective wi nternal wal			ated using	formula 1,	/[(1/U-valu	ie)+0.04] a	ns given in	paragraph	3.2	
Fabric	heat los	s, 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)
	-		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		
	•	•		culated u	• •	•	<						5.65	(36)
	of therma abric he		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 transfer c	oefficier	nt, W/K						(39)m	= (37) + (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		
Heat loss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷	Sum(39)₁ · (4)	12 /12=	50.26	(39)
(40)m= 0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		
			L					/	Average =	Sum(40)1	12 /12=	0.56	(40)
Number of day		, i	,	Max	lun	11	A	Can	Oat	Nev			
(41)m= 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
	20	51	50	51	50	51	51	50	51	50	51		(,
A Materialist													
4. Water heat	ing enei	gy requi	rement:								kWh/ye	ear:	
Assumed occu			_								.62		(42)
if TFA > 13.9 if TFA £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (FFA -13	.9)			
Annual average	-	ater usac	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		96	6.46		(43)
Reduce the annua	-		• •		-	•	to achieve	a water us	se target o		-		
not more that 125			, , , , , , , , , , , , , , , , , , ,		not and co I	, 							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage ir		-					· ,						
(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		
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D)Tm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	1157.54	(44)
(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 instantaneous w	ator hoati	na at point	of uso (no	hot wato	r storago)	ontor 0 in	boyos (16		Fotal = Su	m(45) ₁₁₂ =	=	1517.71	(45)
i									40.00	04.05			(46)
(46)m= 23.6 Water storage	20.64	21.3	18.57	17.82	15.38	14.25	16.35	16.55	19.28	21.05	22.86		(46)
Storage volum		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	eating a	nd no ta	nk in dw	velling, e	nter 110) litres in	(47)						
Otherwise if no	stored	hot wate	er (this ir	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage						<i>.</i>							
a) If manufact				or is kno	wn (kvvr	n/day):					0		(48)
Temperature fa											0		(49)
Energy lost fro		-	•		or is not		(48) x (49)	=		1	10		(50)
Hot water stora			•							0.	.02		(51)
If community h	-			,		.,							. ,
Volume factor										1.	.03		(52)
Temperature fa	actor fro	m Table	2b							0	.6		(53)
Energy lost fro		-	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) or (, ,									1.	.03		(55)
Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	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 contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хH	
(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

Primary circuit loss (annual) from Table 3]	(58)
	•					(59)m = (. ,	. ,						
(mo			rom Tab	le H5 if t	· · · · · ·	solar wat	ter heati	ng and a	a cylinde		· · · · · ·		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 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	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	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output	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	ains 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	1]	
(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)ı	m in calo	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	neating	
5. In	ternal ga	ains (see	e Table 5	5 and 5a):									
Metab	olic gain	s (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	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	lso see	Table 5		<u>.</u>			
(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 gai	ins (calc	ulated ir	Append	dix L, eq	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	1	(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equat	tion L15	or L15a), also se	e Table	5			1	
	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11]	(69)
		ns aains	(Table {	5a)	1		1	ļ	ļ	ļ	ļ		1	
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losse	se.a. ev	aporatio	n (nega	ı tive valu	es) (Tab	ule 5)		<u> </u>	I	I	<u> </u>		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)
	heating		able 5)		I	I		I	I	I	I		1	
(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)
	internal							n + (68)m -					1	
(73)m=	453.65	451.32	436.64	413.02	388.99	366.02	351.25	357.62	369.9	393.74	421.03	441.55	1	(73)
. ,	lar gains		1.00.04	1	1 000.00	1 000.02	1 001.20	1	1		L			x =/
			using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	ne applicat	ole orientat	tion.		
-	ation: A		-	Area		Flu			a		FF		Gains	

Orienta	Table 6d		or	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c	(W)			
North	0.9x	0.77	×	10.44	×	10.63	×	0.35	×	0.8	=	21.53	(74)	
North	0.9x	0.77	×	10.44	×	20.32	×	0.35	×	0.8	=	41.15	(74)	

North	о о . Г									л.,		_				
	0.9x	0.77		x	10.4		x		4.53	X	0.35	×	0.8	=	69.93	(74)
North	0.9x	0.77		x	10.4	44	x	5	5.46	X	0.35	×	0.8	=	112.33	(74)
North	0.9x	0.77		x	10.4	14	X	7	4.72	X	0.35	×	0.8	=	151.31	(74)
North	0.9x	0.77		x	10.4	44	x	7	9.99	X	0.35	×	0.8	=	161.99	(74)
North	0.9x	0.77		x	10.4	44	x	7	4.68	x	0.35	x	0.8	=	151.23	(74)
North	0.9x	0.77		x	10.4	44	x	5	9.25	x	0.35	x	0.8	=	119.99	(74)
North	0.9x	0.77		x	10.4	44	x	4	1.52	x	0.35	x	0.8	=	84.08	(74)
North	0.9x	0.77		x	10.4	14	x	2	4.19	x	0.35	x	0.8	=	48.99	(74)
North	0.9x	0.77		x	10.4	14	x	1	3.12	x	0.35	x	0.8	=	26.57	(74)
North	0.9x	0.77		x	10.4	44	x	8	3.86	x	0.35	x	0.8	=	17.95	(74)
East	0.9x	0.77		x	1.5	3	x	1	9.64	x	0.35	x	0.8	=	5.84	(76)
East	0.9x	0.77		x	1.5	3	x	3	8.42	x	0.35	x	0.8	=	11.42	(76)
East	0.9x	0.77		x	1.5	3	x	6	3.27	×	0.35	x	0.8	=	18.81	(76)
East	0.9x	0.77		x	1.5	3	x	9	2.28	x	0.35	x	0.8	=	27.43	(76)
East	0.9x	0.77		x	1.5	3	x	1'	13.09	x	0.35	x	0.8	=	33.62	(76)
East	0.9x	0.77		x	1.5	3	x	1'	15.77] x	0.35	x	0.8	=	34.42	(76)
East	0.9x	0.77		x	1.5	3	x	1	10.22] x	0.35	x	0.8	=	32.76	(76)
East	0.9x	0.77		x	1.5	3	x	9	4.68] x	0.35	×	0.8	=	28.14	(76)
East	0.9x	0.77		x	1.5	3	x	7	3.59] ×	0.35	×	0.8	=	21.88	(76)
East	0.9x	0.77		x	1.5	3	x	4	5.59] x	0.35	×	0.8	=	13.55	(76)
East	0.9x 0.77 X 1.53 X 24.49 X 0.35 X 0.8 =								7.28	(76)						
East	0.9x	0.77		x	1.5		x		6.15	」 】 x	0.35	_×	0.8	╡_	4.8	(76)
	L									1						
Solar g	ains in	watts, ca	alcula	ated	for each	n mont	h			(83)m	n = Sum(74)m	(82)m				
(83)m=	27.37	52.58	88.7	74	139.76	184.93	3 1	96.4	184	148	.13 105.95	62.54	33.85	22.75]	(83)
Total g	ains – ii	nternal a	nd so	olar	(84)m =	: (73)m	1 + (83)m	, watts							
(84)m=	481.03	503.9	525.	38	552.78	573.93	3 5	62.42	535.25	505	.75 475.86	456.2	8 454.88	464.31		(84)
7. Mea	an inter	nal temp	eratu	ure (heating	seaso	n)									
								area f	rom Tal	ble 9	, Th1 (°C)				21	(85)
Utilisa	tion fac	tor for ga	ains f	for li	ving are	a, h1,	m (s	ее Та	ble 9a)							
[Jan	Feb	Ma	ar	Apr	May	/	Jun	Jul	A	ug Sep	Oc	Nov	Dec]	
(86)m=	1	1	0.9	9	0.94	0.79		0.56	0.4	0.4	4 0.71	0.95	0.99	1	1	(86)
Mean	interna	l tempera	ature	in li	iving are	a T1 (follo	w ste	os 3 to 7	7 in T	able 9c)		-		-	
(87)m=	20.55	20.61	20.7		20.9	20.98		21	21	2	<u>_</u>	20.9	20.71	20.54	7	(87)
	oroturo	طيبتنهم ام	ootin		I	root		alling	from To			1			_	
(88)m=	20.45	20.45	20.4	<u> </u>	20.47	20.47	-	20.48	20.48	20.	9, Th2 (°C) 48 20.47	20.47	20.46	20.46	1	(88)
											-0 201	20.41	20.40	20.40		(00)
r		tor for ga			i		-	· · ·		ŕ		1			7	(00)
(89)m=	1	0.99	0.9	8	0.92	0.75		0.51	0.36	0.3	.66	0.93	0.99	1		(89)
г		· · ·						i		r –	to 7 in Tab	1 <i>′</i>			-	
(90)m=	19.84	19.94	20.1	11	20.34	20.45	2	20.48	20.48	20.		20.35		19.83	<u> </u>	(90)
												fLA = Li	ving area ÷ (4	4) =	0.39	(91)

Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = 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)
	<u> </u>		he mear			i	i		1	·	· · · · · ·	·1		<i>(</i>)
(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)
			uirement		o obtoin		am 11 af			4 T: /'	70)	d #0. 0010	vlata	
			or gains			ied at ste	эрттог	Table 9	o, so tha	t 11,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	:										
(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)
			, W = (94	, i	<i>,</i>	007.54	400.0	000.04		400.00	450.50	400.00		(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)
(96)m=	4.3	age exte	ernal tem 6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		-	an intern					-			/.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)
Spac	e heatin	g require	ement fo	r each m	nonth, k\	Nh/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	r) = Sum(9	8) _{15,912} =	1122.37	(98)
Spac	e heatin	g require	ement in	kWh/m²	/year								12.51	(99)
9b. En	ergy rec	luiremer	nts – Cor	nmunity	heating	scheme								
-		•	ace hea from se			-		• •	•		unity scł	neme.	0	(301)
			from co			•			1) 0 11 11	Une		l	0	(302)
					-	•		allanna fan						(002)
	-		y obtain ne s, geotherr							ip to tour (other neat	sources; tl	ne latter	
Fractic	on of hea	at from C	Commun	ity heat p	oump								1	(303a)
Fractic	on 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 4	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	commun	ity heatir	ng syste	m					1.05	(306)
•	heating	-											kWh/year	, –
Annua	l space	heating	requirem	nent									1122.37	
Space	heat fro	m Comi	munity h	eat pum	р				(98) x (30)4a) x (30	5) x (306) =	-	1178.49	(307a)
Efficie	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 fro	m secon	dary/sup	oplemen	tary syst	em	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
	heating													-
			equirem										2168.55	
			ty schem nunity he)				(64) x (30)3a) x (30	5) x (306) :	-	2276.98	(310a)
Electri	city used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)…([310e)] =	34.55	(313)
Coolin	g Syster	n 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) =		ĺ	0	(315)

DER WorkSheet: New dwelling design stage

Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive inp			Г	218.89	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				-	(330g)
				0]
Total electricity for the above, kWh/year	=(330a) + (330	b) + (330g) =		218.89	(331)
Energy for lighting (calculated in Appendix L)				407.13	(332)
Total delivered energy for all uses (307) + (309) + (310)	+ (312) + (315) + (331) + (33	82)(237b) =		4081.49	(338)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission fac kg CO2/kWh		nissions J CO2/year	
CO2 from other sources of space and water heating (no Efficiency of heat source 1 (%)	t CHP) CHP using two fuels repeat (363) to	(366) for the secor	id fuel	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 (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater or ins	stantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =			466.28	(376)
CO2 associated with electricity for pumps and fans within	in dwelling (331)) x	0.52	=	113.6	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	211.3	(379)
Total CO2, kg/year sum of (376)(382	2) =			791.19	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =				8.82	(384)
El rating (section 14)				92.13	(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: G04 BP Finchley Rd												
Address : G04 BP Finchley Rd, London, NW3 5EY												
1. Overall dwelling dimensions:												
Area(m²) Av. Height(m) Ground floor 92.67 (1a) x 2.54 (2a) =	Volume(m ³) 235.38 (3a)											
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 92.67 (4)												
Dwelling volume $(3a)+(3c)+(3c)+(3d)+(3e)+(3n) =$	235.38 (5)											
2. Ventilation rate:												
main secondary other total heating heating	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	0 (7a)											
Number of passive vents $0 \times 10 =$	0 (7b)											
Number of flueless gas fires $0 \times 40 = 0$	0 (7c)											
Air changes 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 (9) 0 (10)											
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0 (10) 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 strippedWindow infiltration0.25 - [0.2 x (14) ÷ 100] =	0 (14)											
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$	0 (15) 0 (16)											
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area	0 (16) 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)											
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
Monthly overage wind around from Table 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												

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		
			change i	rate for t	he appli	cable ca	se			•				
		al ventila		andix NL (2	2h) _ (22a) v Emy (c	austion (muioo (22)	(22a)			0.5	(23a)
			using Appe) = (23a)			0.5	(23b)
			overy: effici	-	-							4 (00 s)	76.5	(23c)
	balance	d mech	0.26	0.25	0.24	at recove	ery (MV	1	í ``	2b)m + (r <u> </u>	r í	÷ 100]	(24a)
(24a)m=								0.23	0.23	0.24	0.25	0.25		(24a)
D) If (24b)m=	Dalance		anical ve			neat rec			D = (2)	2b)m + (2 0	230)	0		(24b)
· · ·	_						-			0	0	0		(240)
			tract ven		•	•				.5 × (23b))			
(24c)m=	· ,	0	0	0	0	0	0	0	0	0	0	0		(24c)
		ventilatio	on or wh	ole hous	e positiv	e input	ı ventilati	on from	I loft					
			en (24d)							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 p	paramete	er:									
ELEN		Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		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)
	vs Type					3.376		/[1/(0.9)+		2.93				(27)
Floor	- 71 -					92.66		0.1	=	9.2668				(28)
Walls 1	Tvpe1	69.	2	20.3	3	48.87		0.15		7.33			\dashv	(29)
Walls 1		4.0		20.0		1.96		0.13		0.28	╡╏		\dashv	(29)
		lements		2.1		165.9		0.14		0.20	L			(31)
Party v		lemento	,											(31)
Party c						34.98		0	=	0	L r		\dashv	(32b)
•	-	roof wind		ffective wi	ndow H-va	92.67		a formula '	1/[(1/ _vəl	ue)+0.04] a	L s aiven in	naragraph		(320)
			sides of in					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)
	0		ere the de tailed calcu		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 fabric heat loss (33) + (36) =												41.27	(37)	
Ventilatio	on heat	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= 2	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 trar	nsfer co	oefficier	nt, W/K				_		(39)m	= (37) + (3	38)m			
(39)m= 6	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 loss	s paran	neter (H	HP)W/	m²K						Average = = (39)m ÷	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.12 /12=	60.27	(39)
—	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.64	0.65	0.65	0.66		
	I								/	Average =	Sum(40)1	.12 /12=	0.65	(40)
Number					Max	l. un	11	A	Con	Oct	Nevi	Dee		
(41)m=	Jan 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
(41)11=	31	20	31	30	31	30	31	51	30	31	30	31		(41)
4 \\/=+=												1-10/1- /		
4. Wate	r neatir	ng ener	gy requi	rement:								kWh/ye	ear:	
Assumed						40 (T					2.	66		(42)
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														
Annual a	Annual average hot water usage in litres per day Vd, average = $(25 \times N) + 36$ 97.39 (43)													
		-				-	-	to achieve	a water us	e target o	,			
_	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)													
Hot water u	Jan Jan	Feb litres per	Mar dav for ea	Apr https://www.approxedure.com/approxedure.com/approxedure.com/approxedure.com/approxedure.com/approxedure.com/appr	May Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
		103.23	99.33	95.44	91.54	87.65	87.65	91.54	95.44	99.33	103.23	107.13		
(++)=	07.10	100.20	00.00	00.44	01.04	07.00	07.00	01.04		Fotal = Su			1168.64	(44)
Energy cor	ntent of h	ot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x D	0Tm / 3600				L		
(45)m= 1	58.86	138.94	143.38	125	119.94	103.5	95.91	110.06	111.37	129.79	141.68	153.85		
lf instantan	ieous wa	ter heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		Fotal = Su	m(45) ₁₁₂ =		1532.28	(45)
	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 sto			21.01	10.70	17.00	10.02	14.00	10.01	10.71	10.47	21.20	20.00		()
Storage	volume	e (litres)	includin	g any so	olar or W	WHRS	storage	within sa	me ves	sel	()		(47)
If commu	•	-			-			. ,						
Otherwis			hot wate	er (this in	cludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
Water sto a) If mar	-		clared l	oss facto	or is kno	wn (kWł	n/dav).)		(48)
Tempera							"day).)		(40)
Energy lo					ar			(48) x (49)	=		1	-		(50)
b) If mar			-	-		or is not		()			'			(00)
Hot wate		-			e 2 (kWl	h/litre/da	ay)				0.	02		(51)
If commu Volume f	•	-		on 4.3										(50)
Tempera				2b				1.03						(52) (53)
Energy lo					ar			(47) x (51)	x (52) x (53) =		03		(54)
Enter (5			-	, , , , ,	~~			、 ,(- 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	for 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 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	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	ry circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
Primar	ry circuit	loss cal	culated	for each	month (59)m = (58) ÷ 36	65 × (41)	m					
(mo	dified by	factor f	rom 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	i loss ca	lculated	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	neat requ	uired for	water h	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 DI	HW input o	calculated	using App	endix G or	· Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contributi	on to wate	er heating)		
(add a	dditiona	l lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix C	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=	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	. (annual)₁	12	2183.12	(64)
Heat g	ains froi	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m	1	-
(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	ude (57)	m in calo	culation	u of (65)m	only if c	ylinder is	s in the c	dwelling	or hot w	ater is fr	om com	munity h	leating	
	ternal ga			. ,	•	,		Ű				,	0	
	olic gain													
Melau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	133.03	133.03	133.03	133.03	133.03	133.03	133.03	133.03	133.03	133.03	133.03	133.03		(66)
	ng gains						- I 9a) a							
(67)m=	21.75	19.32	15.71	11.9	8.89	7.51	8.11	10.54	14.15	17.97	20.97	22.36		(67)
	nces ga													
(68)m=	243.9	246.43	240.05	226.48	209.34	193.23	182.47	179.94	186.31	199.89	217.03	233.14	l	(68)
									100.01	100.00	211.00	200.11		()
	nd dains	(calcula	ited in A	opendix	L. equat	ion L15	or L15a)), also se	e Table	5				
(69)m=	ng gains 36.3	(caicula 36.3	ted in A 36.3	ppendix 36.3	L, equat 36.3	36.3	or L15a) 36.3), also se 36.3	e Table 36.3	5 36.3	36.3	36.3		(69)
(69)m= Pumps	36.3	36.3	36.3	36.3	· ·		,		1		36.3	36.3		(69)
Pumps	<u> </u>	36.3	36.3	36.3 5a)	36.3	36.3	36.3	36.3	36.3	36.3				. ,
Pumps (70)m=	36.3 s and far	36.3 ns gains 0	36.3 (Table 5	36.3 5a)	36.3 0	36.3 0	,		1		36.3 0	36.3 0		(69) (70)
Pumps (70)m= Losses	36.3 s and far 0 s e.g. ev	36.3 ns gains 0 raporatic	36.3 (Table 5 0 on (nega	36.3 5a) 0 tive valu	36.3 0 es) (Tab	36.3 0 le 5)	36.3 0	36.3 0	36.3 0	36.3 0	0	0		(70)
Pumps (70)m= Losses (71)m=	36.3 s and far 0 s e.g. ev -106.42	36.3 ns gains 0 raporatic -106.42	36.3 (Table 5 0 on (nega -106.42	36.3 5a) 0 tive valu	36.3 0	36.3 0	36.3	36.3	36.3	36.3				. ,
Pumps (70)m= Losses (71)m= Water	36.3 s and far 0 s e.g. ev -106.42 heating	36.3 ns gains o raporatic -106.42 gains (1	36.3 (Table 5 0 n (nega -106.42 Table 5)	36.3 5a) 0 tive valu -106.42	36.3 0 es) (Tab -106.42	36.3 0 le 5) -106.42	36.3 0 -106.42	36.3 0 -106.42	36.3 0 -106.42	36.3 0 -106.42	0	0		(70) (71)
Pumps (70)m= Losses (71)m= Water (72)m=	36.3 s and far 0 s e.g. ev -106.42 heating 130.44	36.3 ns gains o raporatic -106.42 gains (T 128.19	36.3 (Table 5) 0 (nega -106.42 (able 5) 123.51	36.3 5a) 0 tive valu	36.3 0 es) (Tab	36.3 0 le 5) -106.42 107.23	36.3 0 -106.42 102.3	36.3 0 -106.42 108.62	36.3 0 -106.42 110.87	36.3 0 -106.42 117.44	0 -106.42 124.86	0 -106.42 128.2		(70)
Pumps (70)m= Losses (71)m= Water (72)m=	36.3 s and far 0 s e.g. ev -106.42 heating	36.3 ns gains o raporatic -106.42 gains (T 128.19	36.3 (Table 5) 0 (nega -106.42 (able 5) 123.51	36.3 5a) 0 tive valu -106.42	36.3 0 es) (Tab -106.42	36.3 0 le 5) -106.42 107.23	36.3 0 -106.42 102.3	36.3 0 -106.42 108.62	36.3 0 -106.42 110.87	36.3 0 -106.42	0 -106.42 124.86	0 -106.42 128.2		(70) (71)
Pumps (70)m= Losses (71)m= Water (72)m=	36.3 s and far 0 s e.g. ev -106.42 heating 130.44	36.3 ns gains o raporatic -106.42 gains (T 128.19	36.3 (Table 5) 0 (nega -106.42 (able 5) 123.51	36.3 5a) 0 tive valu -106.42	36.3 0 es) (Tab -106.42	36.3 0 le 5) -106.42 107.23	36.3 0 -106.42 102.3	36.3 0 -106.42 108.62	36.3 0 -106.42 110.87	36.3 0 -106.42 117.44	0 -106.42 124.86	0 -106.42 128.2		(70)

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

Orientation:	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	×	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	x	0.8	=	20.76	(74)
North 0.9x	0.77	x	3.1	x	55.46	x	0.35	x	0.8	=	33.34	(74)
North 0.9x	0.77	x	3.1	×	74.72	x	0.35	x	0.8	=	44.91	(74)
North 0.9x	0.77	x	3.1	×	79.99	x	0.35	x	0.8	=	48.08	(74)
North 0.9x	0.77	x	3.1	×	74.68	x	0.35	x	0.8	=	44.89	(74)
North 0.9x	0.77	x	3.1	×	59.25	x	0.35	x	0.8	=	35.62	(74)
North 0.9x	0.77	x	3.1	×	41.52	x	0.35	x	0.8	=	24.96	(74)
North 0.9x	0.77	x	3.1	×	24.19	x	0.35	x	0.8	=	14.54	(74)
North 0.9x	0.77	x	3.1	×	13.12	x	0.35	x	0.8	=	7.89	(74)
North 0.9x	0.77	x	3.1	×	8.86	x	0.35	x	0.8	=	5.33	(74)
South 0.9x	0.77	x	3.1	x	46.75	x	0.35	x	0.8	=	28.1	(78)
South 0.9x	0.77	x	3.1	×	76.57	x	0.35	x	0.8	=	46.03	(78)
South 0.9x	0.77	x	3.1	×	97.53	x	0.35	x	0.8	=	58.63	(78)
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	×	114.87	x	0.35	x	0.8	=	69.05	(78)
South 0.9x	0.77	x	3.1	×	110.55	x	0.35	x	0.8	=	66.45	(78)
South 0.9x	0.77	x	3.1	x	108.01	x	0.35	x	0.8	=	64.93	(78)
South 0.9x	0.77	x	3.1	×	104.89	x	0.35	x	0.8	=	63.06	(78)
South 0.9x	0.77	x	3.1	×	101.89	x	0.35	x	0.8	=	61.25	(78)
South 0.9x	0.77	x	3.1	×	82.59	x	0.35	x	0.8	=	49.65	(78)
South 0.9x	0.77	x	3.1	x	55.42	x	0.35	x	0.8	=	33.31	(78)
South 0.9x	0.77	x	3.1	×	40.4	x	0.35	x	0.8	=	24.28	(78)
Southwest0.9x		x	3.58	×	36.79		0.35	x	0.8	=	25.53	(79)
Southwest0.9x	0.77	x	3.58	×	62.67		0.35	x	0.8	=	43.49	(79)
Southwest0.9x	0.77	x	3.58	x	85.75		0.35	x	0.8	=	59.5	(79)
Southwest0.9x	0.77	x	3.58	×	106.25		0.35	x	0.8	=	73.73	(79)
Southwest0.9x		x	3.58	×	119.01		0.35	x	0.8	=	82.58	(79)
Southwest0.9x	0.77	x	3.58	x	118.15		0.35	x	0.8	=	81.98	(79)
Southwest0.9x		x	3.58	×	113.91		0.35	x	0.8	=	79.04	(79)
Southwest0.9x		x	3.58	×	104.39		0.35	x	0.8	=	72.44	(79)
Southwest0.9x		x	3.58	×	92.85		0.35	x	0.8	=	64.43	(79)
Southwest0.9x		x	3.58	x	69.27		0.35	x	0.8	=	48.06	(79)
Southwest0.9x		x	3.58	×	44.07		0.35	x	0.8	=	30.58	(79)
Southwest0.9x	0.77	x	3.58	×	31.49		0.35	x	0.8	=	21.85	(79)
West 0.9x	0.77	x	7.18	×	19.64	x	0.35	x	0.8	=	27.37	(80)
West 0.9x	0.77	x	7.18	×	38.42	x	0.35	x	0.8	=	53.54	(80)
West 0.9x	0.77	x	7.18	×	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	x	0.8		=	153.58	(80)
West	0.9x	0.77	x	7.1	8	x	g	4.68	x		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	x	0.8		=	63.52	(80)
West	0.9x	0.77	x	7.1	8	x	2	4.49	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)
Northwe	est <mark>0.9x</mark>	0.77	x	3.3	8	x	1	1.28	x		0.35	x	0.8		=	7.39	(81)
Northwe	est <mark>0.9x</mark>	0.77	x	3.3	8	x	2	2.97	x		0.35	x	0.8		=	15.05	(81)
Northwe	est <mark>0.9x</mark>	0.77	x	3.3	8	x	4	1.38	x		0.35	x	0.8		=	27.11	(81)
Northwe	est 0.9x	0.77	x	3.3	8	x	6	57.96	×		0.35	x	0.8		=	44.52	(81)
Northwe	est 0.9x	0.77	x	3.3	8	x	g	1.35	x		0.35	x	0.8		=	59.84	(81)
Northwe	est 0.9x	0.77	x	3.3	8	x	g	7.38	x		0.35	x	0.8		=	63.79	(81)
Northwe	est 0.9x	0.77	x	3.3	8	x		91.1	×		0.35	x	0.8		=	59.68	(81)
Northwe	est 0.9x	0.77	x	3.3	8	x	7	2.63	×		0.35	x	0.8		=	47.58	(81)
Northwe	est 0.9x	0.77	0.77 × 3.38		8	x	5	0.42	x		0.35	x	0.8		=	33.03	(81)
Northwe	est 0.9x	0.77			8	x	28.07		×		0.35	x	0.8		=	18.39	(81)
Northwe	est 0.9x	0.77			8	x	14.2		×		0.35	x	0.8		=	9.3	(81)
Northwe	est <mark>0.9x</mark>	0.77	x	3.3	8	x		9.21	x		0.35	×	0.8		=	6.04	(81)
									-								_
Solar g	ains in	watts, ca	alculated	for eacl	h month	1			(83)m	າ = Sເ	um(74)m	(82)m					
(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	ains – i	nternal a	nd solar	(84)m =	= (73)m	+ (8	83)m	, watts	-								
(84)m=	553.78	627.16	696.35	764.88	808.15	7	92.51	757.9	712	.61	660.44	592.37	7 540.98	526	.6		(84)
7. Me	an inter	nal temp	erature	(heating	seasor	າ)											
Temp	erature	during h	eating p	eriods ir	n the livi	ng	area	from Tab	ole 9	, Th′	1 (°C)					21	(85)
Utilisa	tion fac	tor for g	ains for I	iving are	ea, h1,m	า (s	ee Ta	ble 9a)									_
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	De	ec		
(86)m=	1	0.99	0.97	0.87	0.68	(0.48	0.34	0.3	38	0.62	0.91	0.99	1			(86)
Mean	interna	l temper	ature in l	living are	ea T1 (f	ollo	w ste	ps 3 to 7	7 in T	able	e 9c)						
(87)m=	20.46	20.59	20.76	20.93	20.99		21	21	2		21	20.91	20.66	20.4	14		(87)
Temn	erature	during h	eating n	eriods ir	n rest of	dw	ellina	from Ta	hle (a Th	بر 12 (°C)						
(88)m=	20.37	20.37	20.37	20.38	20.39	-	20.4	20.4	20	· 1	20.39	20.39	20.38	20.3	38		(88)
					vallina	<u>ل</u>		L	<u> </u>								
Utilisa (89)m=	tion fac	tor for ga	0.96	0.84	veiling, 0.64	-	,m (se 0.43		9a) 0.3		0.56	0.89	0.99	1			(89)
						I							0.00				(20)
1		l tempera				<u> </u>			r –	-		,	40.04	40.5			(00)
(90)m=	19.65	19.83	20.07	20.3	20.38		20.4	20.4	20	.4	20.39	20.28	19.94 ring area ÷ (4	19.6	o∠	0.00	(90) (01)
													ing area - (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	n interna	l temper	ature fro	m Table	e 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. Sp	ace hea	ting req	uirement	t										
				•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
the ut		1	or gains	<u> </u>	1	lun	1.1	A	Can	Ort	Nev	Dee		
Litilier	Jan	Feb	Mar ains, hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(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)
			, W = (94			0.10	0.01	0.00	0.00	0.00	0.00			
(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)
		Lade exte	I ernal tem	I		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 me	an interr	nal tempo	erature,	Lm , W =	i =[(39)m :	r x [(93)m	– (96)m	1				
(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 n	nonth, k	Nh/moni	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	311.49	215.2	137.35	38.35	4.85	0	0	0	0	49.93	188.14	324.06		
								Tota	l per year	(kWh/yeai) = Sum(9	8)15,912 =	1269.37	(98)
Space	e heatin	a reauir	ement in	kWh/m²	²/vear								13.7	(99)
			nts – Coi		·	schomo								
					Ĭ			ting prov	ided by	a comm	unity set	omo		
		•				-		(Table 1 ⁻	•		unity Sol	leme.	0	(301)
Fractio	on of spa	ace heat	from co	mmunity	v system	1 – (30'	1) =						1	(302)
						•	,	allows for	CHP and i	un to four	other heat	sources; ti	he latter	
	-		-					See Appel			other neur	<i>6001000, 1</i>		
Fractio	on of hea	at from C	Commun	ity heat	pump								1	(303a)
Fractio	on of tota	al space	heat fro	m Comr	nunity he	eat pump	C			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and	charging	method	l (Table 4	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	12c) for o	commun	ity heatii	ng syste	m					1.05	(306)
	heating		·	,			0,						kWh/yea	 r
•		-	requiren	nent									1269.37	
Space	heat fro	om Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) :	=	1332.84	(307a)
Efficier	ncv of se	econdar	v/supple	mentarv	heating	svstem	in % (frc	om Table	4a or A	ppendix	E)		0	(308
			ment fro		•	•				D1) x 100 -			0	` (309)
Opace	neating	require			iuui y/Sup	picifici	tary Syst		(00) x (00	51) X 100	. (000) –		0	
	heating I water h		requirem	ient									2183.12	7
			ty schen		-)))))))) ())				
			nunity he		U U						5) x (306) :		2292.27	(310a)
			at distrib					0.01	× [(307a).	(307e) +	· (310a)((310e)] =	36.25	(313)
		•	y Efficie										0	(314)
Space	cooling	(if there	is a fixe	ed coolin	g system	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)

DER WorkSheet: New dwelling design stage

Electricity for pumps and fans within dwelling (Table 4			_		
mechanical ventilation - balanced, extract or positive	Input from outside			253.27	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b	o) + (330g) =		253.27	(331)
Energy for lighting (calculated in Appendix L)				384.17	(332)
Total delivered energy for all uses (307) + (309) + (31	10) + (312) + (315) + (331) + (33	2)(237b) =		4262.56	(338)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission fac kg CO2/kWh		nissions J CO2/year	
CO2 from other sources of space and water heating (Efficiency of heat source 1 (%)	(not CHP) is CHP using two fuels repeat (363) to a	(366) for the secor	nd fuel	400	(367a)
CO2 associated with heat source 1	[(307b)+(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 systems	(363)(366) + (368)(372	?)	=	489.17	(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 heating	(373) + (374) + (375) =			489.17	(376)
CO2 associated with electricity for pumps and fans w	ithin dwelling (331)) x	0.52	=	131.45	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	199.39	(379)
Total CO2, kg/year sum of (376)((382) =			820.01	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =				8.85	(384)
El rating (section 14)				92.02	(385)

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

roject Informati	on:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details				
EW DWELLING	DESIGN STAGE		Total Floor Area: 49	9.38m²
ite Reference :	BP Finchley Roa	d	Plot Reference:	401 BP Finchley Rd
ddress :	401 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame:				
ddress :				
his report cove	rs items included	within the SAP calculations.		
is not a comple	ete report of regula	ations compliance.		
1a TER and DE				
	ting system: Electric	city (c)		
uel factor: 1.55 (arget Carbon Di	electricity (c))		29.16 kg/m²	
-	Dioxide Emission Ration	. ,	11.08 kg/m ²	ОК
1b TFEE and D			11.00 kg/m	OR
	ergy Efficiency (TFE	E)	48.1 kWh/m²	
welling Fabric E	nergy Efficiency (DI	FEE)	37.4 kWh/m²	
				ОК
2 Fabric U-valu	es			
Element		Average	Highest	
External		0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	u ll	0.00 (max. 0.20)	-	OK
Floor Roof		(no floor) 0.10 (max. 0.20)	0.10 (max. 0.35)	ОК
Opening	s	0.97 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal bric		0.01 (110)	1.20 (max. 0.00)	UN
		from linear thermal transmittand	ces for each junction	
3 Air permeabil			ŕ	
Air permea	bility at 50 pascals		3.00 (design valu	ie)
Maximum			10.0	ОК
4 Heating effici	ency			
	ng system:	Community heating scheme	s - Heat pump	
Main Heati	haating avatage.	Nana		
Main Heati	heating system:	None		
Main Heati		None		
Main Heati Secondary	lation	None No cylinder		
Main Heati Secondary 5 Cylinder insu	lation			
Main Heati Secondary 5 Cylinder insu Hot water S	lation			
Main Heati Secondary 5 Cylinder insu Hot water \$ 6 Controls	lation Storage: ting controls		se of community heating, pr	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	4.58m ²	
Windows facing: South East	2.94m 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	0.1 W/m²K	
Party Walls U-value	0 W/m²K	
On a second to be at the set for an all states to be at the second		

Community heating, heat from electric heat pump

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STR0036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: 103 BP Finchley RdAddress:103 BP Finchley Rd, London, NW3 5EYAverail dwelling dimensions:Area(m?)Av. Height(m)Volume(m?)Ground floor 49.6 $(1a) \times$ 2.54 $(2a) =$ 125.98 $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 49.6 (a) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ (125.98) (5) 2. Ventilation rate:mainsecondary heatingothertotalm³ per hourNumber of chimneys 0 $+$ 0 $=$ 0 $(40 =$ 0 Number of passive vents 0 $+$ 0 $=$ 0 $(7a)$ Number of flueless gas fires 0 $+$ 0 $=$ 0 $(7a)$ Number of storeys in the dwelling (ns) 40 0 (10) (9) (10) Additioni infiltration 0 0 (10) 0 (11) iboth 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 0 (12)
Property Address: 103 BP Finchley RdAddress :103 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m ²) 49.6Av. Height(m) 2.54Volume(m ⁹) 125.98Ground floor49.6(1a) x2.54(2a) =125.98(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)49.6(4)Volume(mail 125.98(5)Verified or area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)49.6(4)Volume(mail 2.54(2a) =125.98(5)Verified or area TFA = (1a)+(1b)+(1c)+(1e)+(1e)+(1n)49.6(4)mail 9mail 9(5)(5)Verified or area TFA = (1a)+(1b)+(1c)+(1e)+(1e)+(1e)+(1e)+(1e)+(1e)+(1e)+(1e
Address :103 BP Finchley Rd, London, NW3 5EYI. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 49.6 $(1a) \times 2.54$ $(2a) =$ 125.98 $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 49.6 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.98 (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.98 (5) Number of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 $(6a)$ Number of pan flues 0 $+$ 0 $=$ 0 $x20 =$ 0 $(6a)$ Number of pansive vents 0 $x10 =$ 0 $(7a)$ 0 $x10 =$ 0 $(7a)$ Number of flueless gas fires 0 $x10 =$ 0 $x40 =$ 0 $(7c)$ Inflitration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7c) =$ 0 $+$ $(6) =$ 0 $(6) =$ 0 (6) Number of storeys in the dwelling (ns) $Additional infiltration(9)-1]x0.1 =0(10)0(10)Structural infiltration0.25 for steel or timber frame or 0.35 for masonry construction(9)-1]x0.1 =0(10)i both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if aqual user 0.35000$
Area(m ²)Av. Height(m)Volume(m ³)Ground floorArea(m ²)Av. Height(m)Volume(m ³)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.6 (4) 125.98 (3a)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.98 (5)2. Ventilation rate:Number of chimneysovolume
Area(m²)Av. Height(m)Volume(m³)Ground floor 49.6 (1a) x 2.54 (2a) = 125.98 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.6 (4) 49.6 (4)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.98 (5) 2. Ventilation rate: $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.98 (5)Number of chimneys 0 + 0 + 0 = 0 (6a)Number of open flues 0 + 0 + 0 = 0 (6b)Number of intermittent fans 0 + 0 + 0 = 0 (7a)Number of flueless gas fires 0 x 10 = 0 (7b)Number of flueless gas fires 0 x 40 = 0 (7c)Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $\div (5) =$ 0 (8)I 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) $(9)+1x0.1 =$ 0 (10)Additional infiltration $(9)-1x0.1 =$ 0 (10) (1) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (1) (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
Ground floor 49.6 $(1a) \times 2.54$ $(2a) = 125.98$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 49.6 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.98$ (5) 2. Ventilation rate: $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.98$ (5) Number of chimneys 0 $+$ 0 $=$ 0 Number of open flues 0 $+$ 0 $=$ 0 $(40) = 0$ Number of intermittent fans 0 $+$ 0 $=$ 0 $(7a)$ Number of flueless gas fires 0 $\times 10 =$ 0 $(7c)$ Number of flueless gas fires 0 $\times 40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $+$ 0 $=$ 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) $(9)-1]x0.1 =$ 0 (9) Additional 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 deducing areas of openings); if equal user 0.35 0 0
Dwelling volume $(3a)+(3c)+(3d)+(3c)+(3n) =$ 125.98 (5)2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hourNumber of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $x20 =$ 0 (6b)Number of intermittent fans 0 $x10 =$ 0 (7a)Number of passive vents 0 $x10 =$ 0 (7b)Number of flueless gas fires 0 $x40 =$ 0 (7c)Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0 $+$ 6 0 (8)Infiltration due to chimneys in the dwelling (ns) 0 (9) (10) (9) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (9) (11) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11) (11)
2. Ventilation rate:Number of chimneys 0 + 0 = 0 $x40 =$ 0 $(6a)$ Number of open flues 0 + 0 + 0 = 0 $x40 =$ 0 $(6a)$ Number of open flues 0 + 0 + 0 = 0 $x20 =$ 0 $(6b)$ Number of intermittent fans 0 $x10 =$ 0 $(7a)$ 0 $x10 =$ 0 $(7a)$ Number of passive vents 0 $x10 =$ 0 $(7b)$ 0 $x40 =$ 0 $(7c)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Air changes per hourInfiltration 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) (9) (9) Number of storeys in the dwelling (ns) (9) (9) (9) (11) Additional infiltration 0 0 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
main heatingsecondary heatingother heatingtotalm³ per hourNumber of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $x20 =$ 0 (6b)Number of intermittent fans 0 $x10 =$ 0 $(7a)$ Number of passive vents 0 $x10 =$ 0 $(7a)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Number of flueless gas fires 0 $x40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 0 \div (5) = 0 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) (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 0 0
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 $(7a)$ Number of flueless gas fires 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Infiltration due to chimneys, flues and fans = $(6a) + (6b) + (7a) + (7b) + (7c) =$ 0 $\div (5) =$ 0 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) $((9) - 1)x 0.1 =$ 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 0.35
Number of open flues 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 hourInfiltration 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) 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 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 (11)
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 hourInfiltration 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) 0 (9) Number of storeys in the dwelling (ns) 0 (9) (10) Additional infiltration (9) (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 0
Number of passive vents 0 $x 10 =$ 0 (7) Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ Air changes per hourInfiltration 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) 0 (9) Number of storeys in the dwelling (ns) 0 (9) (10) Additional infiltration (9) (10) Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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
Number of flueless gas fires Number of flueless gas fires 0 $x 40 = 0$ (7c) Air changes per hour Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ <i>if a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)</i> Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35</i>
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) \bigcirc (9)(9)Number of storeys in the dwelling (ns)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 0.350.35
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) \bigcirc (9)(9)Number of storeys in the dwelling (ns)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 0.350.35
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ <i>if a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)</i> Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35</i>
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 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
Number of storeys in the dwelling (ns) 0 (9) Additional infiltration 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 (11)
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 (11)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction <i>if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35</i>
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped 0 (14)Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0
$\frac{1}{1} = \frac{1}{1} = \frac{1}$
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 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)
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

Adjusted infilt	ration 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		
Calculate effe		-	rate for t	he appli	cable ca	se			-	-	-		
If exhaust air h			endix N (2	3h) - (23a) x Fmv (e	auation (N	(5)) othe	rwise (23h) – (23a)			0.5	(23a)
If balanced wit		0 11	. (, ,	, (• •	<i>,,</i> .	``) = (200)			0.5	(23b)
a) If balanc		-	-	-					2h)m + (23b) v [[,]	1 – (23c)	76.5 	(23c)
(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	÷ 100]	(24a)
b) If balanc													
(24b)m= 0			0	0	0		0	0	0	0	0		(24b)
c) If whole I	house ex	tract ver	tilation c	or positiv	re input v	ventilatio	n from c	utside					
	m < 0.5 >			•	•				.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	l ventilatio m = 1, th								0.51				
(24d)m = 0				0	0	0				0	0		(24d)
Effective ai			-) or (24h) or (24		-	_					
(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)
		I				I		1	1			ļ	
3. Heat losse					N. A.			_			1 -1		
ELEMENT	Gros area		Openin m		Net Ar A ,n		U-valı W/m2		A X U (W/I		k-value kJ/m²∙l		A X k kJ/K
Doors					2.1	x	1.2	=	2.52				(26)
Windows Typ	e 1				6.649) x1/	/[1/(0.9)+	0.04] =	5.78				(27)
Windows Typ	e 2				3.035	; x1/	/[1/(0.9)+	0.04] =	2.64				(27)
Walls Type1	27.2	26	9.68		17.58	3 X	0.15	=	2.64				(29)
Walls Type2	20.0)5	2.1		17.95	5 X	0.14	=	2.54				(29)
Total area of	elements	s, m²			47.31								(31)
Party wall					29.85	5 x	0	=	0				(32)
Party floor					49.6					[\neg	(32a)
Party ceiling					49.6					Ī		\exists	(32b)
* for windows and ** include the are						ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
Fabric heat lo	ss, W/K	= S (A x	U)				(26)(30)) + (32) =				16.11	(33)
Heat capacity	Cm = S	(Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	6947.17	(34)
Thermal mass	s parame	eter (TMF	P = Cm ÷	TFA) in	n kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design asses can be used inste				constructi	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg				using Ap	pendix ł	<						4.97	(36)
if details of therm	nal bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric he	eat loss							(33) +	(36) =			21.08	(37)
Ventilation he	at loss c	alculated	monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 11.05	10.93	10.81	10.2	10.08	9.48	9.48	9.36	9.72	10.08	10.32	10.56		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (3	38)m		I	
(39)m= 32.12	32	31.88	31.28	31.16	30.55	30.55	30.43	30.8	31.16	31.4	31.64		
Stroma FSAP 20	12 Version	: 1.0.5.16 ((SAP 9.92)	- http://ww	ww.stroma	.com			Average =	Sum(39)1	12 /12=	31.2 Б а	<u>ge 2 o</u> f ³⁹⁾

DER WorkSheet: New dwelling design stage

Heat loss parameter (HLP), W/m ² K (40)m = $(39)m \div (4)$														
(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										1	
4. Wa	ter heat	ing ene	rgy requ	irement:								kWh/ye	ear:	
if TF.				: [1 - exp	(-0.0003	849 x (TF	-13.9)2)] + 0.(0013 x (1	ГFA -13.		68]	(42)
Annual <i>Reduce</i>	averag	e hot wa al average	hot water		5% if the a	lwelling is	designed t	(25 x N) to achieve		se target o		.06]	(43)
			· ·	1		1	, I	Aug	Son	Oct	Nov	Dee		
Hot wate	Jan er usage ir	Feb n litres per	Mar day for ea	Apr ach month	May Vd,m = fa	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	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]	
(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	01.11	10.0	10.01	12.00	00.02	00.00	00.00	00.02			m(44) ₁₁₂ =		888.72	(44)
Energy o	Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)													
(45)m=	= 120.81 105.66 109.03 95.06 91.21 78.71 72.93 83.69 84.69 98.7													
lf instant	aneous w	ator hoati	na at noint	t of use (no	hot water	r storage)	enter () in	boxes (46		Fotal = Su	m(45) ₁₁₂ =		1165.25	(45)
			- ·	· ·			i — — —					(40)		
(46)m= Water	18.12 storage	15.85 IOSS:	16.36	14.26	13.68	11.81	10.94	12.55	12.7	14.81	16.16	17.55		(46)
	-		includir	ng any so	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)					1	
			hot wate	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
	storage				! l		· (-)-						1	(10)
,				oss facto	or is kno	wn (kvvr	i/day):					0		(48)
			m Table					(40) (40)				0		(49)
•••			-	e, kWh/ye cylinder l		or is not		(48) x (49)) =		1'	10		(50)
				rom Tabl							0.	02		(51)
	•	-	ee secti	on 4.3										
		from Ta		0								03		(52)
			m Table								0	.6		(53)
•••			-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
		54) in (5	,	for agab	month			((EG)m - (EE) v (44);	~	1.	03		(55)
	-		1	for each			i	((56)m = (1	(50)
(56)m= 32.01 28.92 32.01 30.98 32.01 <t< td=""><td>30.98</td><td>32.01</td><td>liv H</td><td>(56)</td></t<>									30.98	32.01	liv H	(56)		
				- · ·			·- ·	· · ·					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)
		•	,	om Table								0		(58)
								65 × (41)		thormo	etat)			
(moc (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	23.26	22.51	23.26]	(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	κ.Η	(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. Int	ternal d	ains (see	e Table	5	and 5a):	•				-						-	-	
		ns (Table																	
motab	Jan	Feb	Mar		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	-	33.92	83.92	83.	-	83.92	83.92	-	83.92	83	.92		(66)
Liahtin	a aains	s (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	1	4.54	4.91	6.3		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		143.89	-	135.75	125.48	-	15.82	109.37	107		111.68	119.8	31	130.09	139	9.74		(68)
		s (calcula		_			_												
(69)m=	31.39	31.39	31.39	<u> </u>	31.39	31.39	-	31.39	31.39	31.		31.39	31.39	9	31.39	31	.39		(69)
		I Ins gains					I												
(70)m=				T	0	0	Γ	0	0	0)	0	0		0		0		(70)
		vaporatic	n (nea	ativ					-						-		-		
		-67.13					·	67.13	-67.13	-67	.13	-67.13	-67.1	3	-67.13	-67	7.13		(71)
		gains (1		_	00					•				<u> </u>					
(72)m=	113.43	, , , ,	108.17	<u>_</u>	103.34	100.2		95.79	92.03	96.	84	98.55	103.5	5	109.19	111	1.73		(72)
		l gains =			100.01	100.2)m + (67)m										(/
(73)m=	320.96	- <u>-</u>	309.73		294.46	279.23	2	64.32	254.48	259	·	266.96	282.4	<u> </u>	300.14		3.17	l	(73)
. ,	lar gain		000.70	<u></u>	234.40	213.23	2	04.52	234.40	200	.20	200.00	202.4	<u> </u>	300.14				(10)
		calculated	using so	lar	flux from	Table 6a	and	assoc	iated equa	tions	to co	onvert to th	ne applio	cable	e orientat	tion.			
-		Access F	-		Area			Flu				g_			FF			Gains	
		Table 6d			m²				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		x		62.67	x		0.35	× ٦		0.8		=	36.91](77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0		x		35.75	x		0.35	× ٦		0.8		=	50.5](77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0		x		06.25	x		0.35	۲ ×		0.8		=	62.57](77)
Southe	ast <mark>0.9x</mark>	0.77		x	3.0		x		19.01	x		0.35	۲ ×	\vdash	0.8		=	70.09](77)
		5.17			0.0			'		I				L	0.0				∟` ′

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

Results and l	nputs inforn	nea by	aevelop	Jer decia	aralion.	Any dev	เลแบก	IS Certain	to outp	u uneren	l lesuits.		
Southeast 0.9x	0.77	x	3.0	4	x	118.15	x	0.35	x	0.8	=	69.58	(77)
Southeast 0.9x	0.77	x	3.0	4	x	113.91	x	0.35	x	0.8	=	67.08	(77)
Southeast 0.9x	0.77	x	3.0	4	x	104.39	x	0.35	x	0.8	=	61.48	(77)
Southeast 0.9x	0.77	x	3.0	4	x	92.85	x	0.35	x	0.8	=	54.68	(77)
Southeast 0.9x	0.77	x	3.0	4	x	69.27	x	0.35	x	0.8	=	40.79	(77)
Southeast 0.9x	0.77	x	3.0	4	x	44.07	x	0.35	x	0.8	=	25.95	(77)
Southeast 0.9x	0.77	x	3.0	4	x	31.49	x	0.35	x	0.8	=	18.54	(77)
Southwest0.9x	0.77	x	6.6	5	x	36.79]	0.35	x	0.8	=	47.47	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	62.67]	0.35	x	0.8	=	80.86	(79)
Southwest0.9x	0.77	x	6.6	5	x	85.75]	0.35	x	0.8	=	110.64	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	106.25]	0.35	x	0.8	=	137.08	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	119.01]	0.35	x	0.8	=	153.54	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	118.15]	0.35	x	0.8	=	152.43	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	113.91]	0.35	x	0.8	=	146.96	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	104.39		0.35	x	0.8	=	134.68	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	92.85		0.35	x	0.8	=	119.79	(79)
Southwest _{0.9x}	0.77	x	6.6	5	×	69.27		0.35	x	0.8	=	89.37	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	44.07]	0.35	x	0.8	=	56.86	(79)
Southwest0.9x	0.77	x	6.6	5	x	31.49]	0.35	x	0.8	=	40.62	(79)
Solar gains in	1	1			i		r í	i = Sum(74)r			1	l	()
(83)m= 69.14		61.14	199.66	223.63	222.01	214.04	196	.16 174.4	3 130.1	82.81	59.17		(83)
Total gains –						1	455		4 440 5	7 000 05	070.04	l	(94)
(84)m= 390.09		170.87	494.11	502.86	486.33	468.53	455	5.4 441.4	4 412.5	7 382.95	372.34		(84)
7. Mean inte					,								_
Temperature	-				-		ble 9,	Th1 (°C)				21	(85)
Utilisation fa	т – – – – – –				È.		<u> </u>				_		
Jan	Feb	Mar	Apr	May	Jun	Jul		ug Sep			Dec		(00)
(86)m= 0.98	0.95	0.88	0.74	0.57	0.4	0.29	0.3	0.48	0.76	0.94	0.98		(86)
Mean interna	<u> </u>	ī			1	-i	1	<u>_</u>			1	l	
(87)m= 20.68	20.79	20.9	20.98	21	21	21	2'	1 21	20.98	20.84	20.65		(87)
Temperature	during hea	ating p	eriods ir	n rest of	dwellin	g from Ta	able 9	9, Th2 (°C)		-		
(88)m= 20.39	20.39	20.39	20.4	20.4	20.42	20.42	20.4	42 20.41	20.4	20.4	20.4		(88)
Utilisation fa	ctor for gair	ns for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.97	0.94	0.86	0.71	0.54	0.37	0.25	0.2	.7 0.44	0.72	0.93	0.98		(89)
Mean interna	al temperati	ure in t	he rest	of dwelli	ng T2 (follow ste	eps 3	to 7 in Ta	ble 9c)				
(90)m= 19.97	<u> </u>	20.28	20.38	20.4	20.42	20.42	20.4	- i		20.21	19.94		(90)
L					Į			1	fLA = Liv	/ing area ÷ (4	4) =	0.62	(91)
												L	

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

(92)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	(92)
													-

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. Space hea	ating requ	irement											
Set Ti to the					ned at st	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation		<u> </u>			lun	1.1	<u> </u>	San	Oct	Nov	Dee		
Jan Utilisation fac	Feb	Mar Mar hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(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)
Useful gains,	, hmGm ,	W = (94		L 4)m				I					
(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)
Monthly aver	rage exter	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 rat	1 1	i i	· ·		1	1 /	1 / /	– (96)m]	1			
(97)m= 517.44		451.62	370.66	282.62	188.74	127.63	133.24	205.56	316.31	423.9	512.08		(97)
Space heatir		1		1	1	1	1	· · · · ·	i	r.			
(98)m= 102.48	59.9	30.58	6.51	0.74	0	0	0	0	6.48	48.19	109.71		
							Tota	al per year	(kWh/yea	r) = Sum(9	8)15,912 =	364.59	(98)
Space heatir	ng require	ment in	kWh/m ²	/year								7.35	(99)
9b. Energy ree	quirement	ts – Con	nmunity	heating	scheme)							
This part is us										unity scł	neme.		
Fraction of spa	ace heat	from sec	condary/	/supplen	nentary	heating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from cor	mmunity	system	1 – (30	1) =						1	(302)
The community s	-			everal sou	rces. The j	nrocoduro	allows for						
includes boilers, l	heat pumps.								up to tour	other heat	sources; ti	ne latter	
Fraction of he		-							up to four	other heat	sources; ti		(303a)
Fraction of he	at from C	ommuni	ity heat	pump	from powe	r stations.						1	(303a)
Fraction of tot	at from C al space I	ommuni heat fror	ity heat m Comn	pump nunity he	from powe	r stations. p	See Appe	ndix C.	(3	other heat 02) x (303			(304a)
	at from C al space I	ommuni heat fror	ity heat m Comn	pump nunity he	from powe	r stations. p	See Appe	ndix C.	(3			1	
Fraction of tot	at from C al space I trol and c	ommuni heat fror harging	ity heat m Comn method	pump nunity he (Table -	from powe eat pump 4c(3)) fo	r stations. p pr comm	See Appe unity hea	ndix C.	(3			1	(304a)
Fraction of tot Factor for con	at from C al space I trol and c ss factor (ommuni heat fror harging	ity heat m Comn method	pump nunity he (Table -	from powe eat pump 4c(3)) fo	r stations. p pr comm	See Appe unity hea	ndix C.	(3			1 1 1 1	(304a) (305) (306)
Fraction of tot Factor for con Distribution los	at from C al space I itrol and c ss factor (ommuni heat fror harging (Table 1	ity heat m Comn method 2c) for c	pump nunity he (Table -	from powe eat pump 4c(3)) fo	r stations. p pr comm	See Appe unity hea	ndix C.	(3			1 1 1 1.05	(304a) (305) (306)
Fraction of tot Factor for con Distribution los Space heatin	at from C cal space I atrol and c ss factor (g heating r	ommuni heat fror harging (Table 1 equirem	ity heat p m Comn method 2c) for c nent	pump nunity he (Table - commun	from powe eat pump 4c(3)) fo	r stations. p pr comm	See Appe unity hea	ndix C. ating sys	(3 tem		a) =	1 1 1.05 kWh/yea	(304a) (305) (306)
Fraction of tot Factor for con Distribution los Space heatin Annual space	at from C cal space I atrol and c ss factor (g heating r om Comm	ommuni heat fror harging (Table 1 equirem hunity he	ity heat p m Comn method 2c) for c nent eat pump	pump nunity he (Table - commun	from powe eat pump 4c(3)) fo ity heati	r stations. p or commi ng syste	See Appe unity hea m	ndix C. ating sys (98) x (30	(3 tem 04a) x (30	02) x (303 5) x (306) ;	a) =	1 1 1.05 kWh/yea 364.59	(304a) (305) (306) ar
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s	at from C al space I atrol and c ss factor (g heating r om Comm secondary	ommuni heat fror harging (Table 1 equirem hunity he suppler	ity heat p m Comm method 2c) for c nent eat pump mentary	pump nunity he (Table - commun p heating	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Appe unity hea m om Table	ndix C. ating sys (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	02) x (303 5) x (306) ≅ ∶ E)	a) =	1 1 1.05 kWh/yea 364.59 382.82 0	(304a) (305) (306) ar (307a) (308
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro	at from C al space I atrol and c ss factor (g heating r om Comm secondary	ommuni heat fror harging (Table 1 equirem hunity he suppler	ity heat p m Comm method 2c) for c nent eat pump mentary	pump nunity he (Table - commun p heating	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Appe unity hea m om Table	ndix C. ating sys (98) x (30 e 4a or A	(3 tem 04a) x (30	02) x (303 5) x (306) ≅ ∶ E)	a) =	1 1 1.05 kWh/yea 364.59 382.82	(304a) (305) (306) ar (307a)
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s	at from C al space I atrol and c ss factor (b heating r om Comm secondary g requiren g	ommuni heat fror harging (Table 1 equirem hunity he suppler nent fror	ity heat p m Comm method 2c) for c nent eat pump mentary m secon	pump nunity he (Table - commun p heating	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Appe unity hea m om Table	ndix C. ating sys (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	02) x (303 5) x (306) ≅ ∶ E)	a) =	1 1 1.05 kWh/yea 364.59 382.82 0	(304a) (305) (306) ar (307a) (308
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating	at from C al space I atrol and c ss factor (9 heating r becondary g requiren 9 heating re community	ommuni heat fror harging (Table 1 equirem nunity he suppler nent fror equirem y schem	ity heat p m Comm method 2c) for c nent eat pump mentary m secon ent ne:	pump nunity he (Table - commun p heating dary/su	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Appe unity hea m om Table	ndix C. ating sys (98) x (30 e 4a or A (98) x (30	(3 tem 04a) x (30 ppendix 01) x 100	02) x (303 5) x (306) ≅ ∶ E)	a) = =	1 1 1.05 kWh/yea 364.59 382.82 0 0	(304a) (305) (306) ar (307a) (308
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c	at from C al space I atrol and c ss factor (9 heating r becondary g requiren 9 heating re community om Comm	ommuni heat fror harging (Table 1 equirem nunity he suppler nent fror equirem y schem nunity he	ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump	pump nunity he (Table - commun p heating dary/su	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Apper unity hea m om Table tem	ndix C. ating sys (98) x (30 e 4a or A (98) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	02) x (303 5) x (306) ; ∶ E) ÷ (308) = 5) x (306) ;	a) = =	1 1 1.05 kWh/yea 364.59 382.82 0 0 0 1816.09	(304a) (305) (306) ar (307a) (308 (309)
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c Water heat fro Electricity use	at from C al space I atrol and c ss factor (9 heating r becondary g requiren 9 heating re community om Comm	ommuni heat fror harging (Table 1 equirem nunity he suppler nent fror equirem y schem nunity he t distribu	ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump ution	pump nunity he (Table - commun p heating dary/sup	from powe eat pump 4c(3)) fo ity heating system	r stations. p or commu ng syste in % (fro	See Apper unity hea m om Table tem	ndix C. ating sys (98) x (30 e 4a or A (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	02) x (303 5) x (306) ; ∶ E) ÷ (308) = 5) x (306) ;	a) = =	1 1 1.05 kWh/yea 364.59 382.82 0 0 0 1816.09 1906.89 22.9	(304a) (305) (306) ar (307a) (308 (309) (309) (310a) (313)
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from co Water heat fro Electricity use Cooling Syste	at from C al space I atrol and c ss factor (9 heating r becondary g requiren 9 heating re community om Comm at for heat em Energy	ommuni heat fror harging (Table 1 equirem hunity he suppler nent fror equirem y schem hunity he t distribu / Efficier	ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump dition ncy Ratio	pump nunity he (Table - commun p heating dary/sup	from powe eat pump 4c(3)) fo ity heating system pplemen	r stations. p or commi ng syste in % (fro	See Appen unity hea m om Table tem 0.01	ndix C. ating sys (98) x (30 e 4a or A (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	02) x (303 5) x (306) ; ∶ E) ÷ (308) = 5) x (306) ;	a) = =	1 1 1.05 kWh/yea 364.59 382.82 0 0 0 1816.09 1906.89	(304a) (305) (306) ar (307a) (308 (309) (309)
Fraction of tot Factor for con Distribution los Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c Water heat fro Electricity use	at from C al space I atrol and c ss factor (g heating r om Comm secondary g requiren g heating re community om Comm ad for heat en Energy g (if there	ommuni heat fror harging (Table 1 equirem hunity he solution y schem hunity he t distribu y Efficier is a fixed	ity heat p m Comm method 2c) for c nent eat pump mentary m secon ent ne: eat pump ution ncy Ratio d cooling	pump nunity he (Table - commun p heating dary/sup o o g system	from powe eat pump 4c(3)) fo ity heatin system pplemen	r stations. p or commi ng syste in % (fro itary sys	See Appen unity hea m om Table tem 0.01	ndix C. (98) x (30 (98) x (30 (64) x (30 (64) x (30 x [(307a).	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	02) x (303 5) x (306) ; ∶ E) ÷ (308) = 5) x (306) ;	a) = =	1 1 1.05 kWh/yea 364.59 382.82 0 0 0 1816.09 1906.89 22.9 0	(304a) (305) (306) ar (307a) (308 (309) (309) (310a) (313) (314)

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 Append	dix L)				232.42	(332)
Total delivered energy for all uses (307)	+ (309) + (310) +	· (312) + (315) + (331) + (33	2)(237b) =		2643.16	(338)
12b. CO2 Emissions – Community heat	ing scheme					-
		Energy kWh/year	Emission fac kg CO2/kWh		nissions g CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)	• •	CHP) HP using two fuels repeat (363) to (366) for the second	d fuel	400	(367a)
CO2 associated with heat source 1	I	(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 s	ystems	(363)(366) + (368)(372)	=	308.97	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	ion heater or inst	antaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			308.97	(376)
CO2 associated with electricity for pump	os and fans within	dwelling (331)) x	0.52	=	62.82	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52	=	120.62	(379)
Total CO2, kg/year	sum of (376)(382)	=			492.41	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				9.93	(384)
El rating (section 14)					93.02	(385)

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn Berry Stroma FSAP 2012Stroma Number:STRO036659 Version:Software Name:Stroma FSAP 2012Software Version:Version:Property Address: G02 BP Finchley RdAddress :G02 BP Finchley Rd, London, NW3 5EYAddress:G02 BP Finchley Rd, London, NW3 5EYArea(m ²)Av. Height(m)Volume(m ³)Ground floorGround floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 49.44 $(1a) \times 2.54$ $(2a) = 125.59$ $(3a)$ Other $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.59$ $(5a)$ Number of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 $(6a)$ Number of open flues 0 $+$ 0 $=$ 0 $x40 =$ 0 $(6a)$ Number of intermittent fans 0 $+$ 0 $=$ 0 $x40 =$ 0 $(6a)$
Property Address: G02 BP Finchley RdAddress :G02 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions: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) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.59 (5)C ventilation rate:Number of chimneys 0 + 0 + 0 = 0 × 40 = 0 (6a)Number of open flues 0 + 0 + 0 = 0 (6b)
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 (4) (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.59 (5)Central dimensions:Number of chimneys 0 + 0 + 0 = 0 $x 40 =$ 0 (6a)Number of open flues 0 + 0 + 0 = 0 $x 20 =$ 0 (6b)
1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)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) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 125.59$ (5) Dwelling volume(3a)Owned to the secondary heatingother totalm³ per hourNumber of chimneys0+ 00x 40 = 0(6a)Number of chimneys0+ 0+ 0colspan="2">Colspan="2">O(6a)Number of open flues0+ 0+ 0• 0(6b)
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 (4) $(3a)+(3c)+(3d)+(3e)+(3n) =$ 125.59 (5)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.59 (5) $(5b)$ 2. Ventilation rate: m^3 per hourNumber of chimneys $0 + 0 + 0 = 0$ $x 40 = 0$ (6a)Number of open flues $0 + 0 + 0 = 0$ $x 20 = 0$ (6b)
Ground floor Ground floor Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+\dots(1n)$ Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+\dots(3n) =$ 2. Ventilation rate: Number of chimneys Number of open flues 0 + 0 + 0 = 0 × 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 × 20 = 0 (6b)
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 125.59(5)2. Ventilation rate:main heatingsecondary heatingothertotalm³ per hourNumber of chimneys0+0=0× 40 =0(6a)Number of open flues0+0+0=0× 20 =0(6b)
2. Ventilation rate:Number of chimneys 0 + 0 + 0 = 0 $x 40 =$ 0 $(6a)$ Number of open flues 0 + 0 + 0 = 0 $x 40 =$ 0 $(6b)$
main heatingsecondary heatingothertotal m^3 per hourNumber of chimneys0+0+0=0× 40 =0(6a)Number of open flues0+0+0=0× 20 =0(6b)
Number of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $\times 40$ 0 $(6a)$ Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $\times 20$ 0 $(6b)$
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 $0 \times 10 = 0$ (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)
Number of storeys in the dwelling (ns)0(9)Additional infiltration[(9)-1]x0.1 =0(10)
Additional infiltration $[(9)-1]\times 0.1 = 0$ (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 0 (13)
Percentage of windows and doors draught stripped 0 (14)Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0
$\frac{1}{1} = \frac{1}{1} = \frac{1}$
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 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)
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

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

Adjuste	ed infiltra	ation rat	e (allowi	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		
		<i>ctive air</i> al ventila	-	rate for t	he appli	cable ca	se		-	-			0.5	(23a)
				endix N, (2	3b) = (23a	i) x Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0.5	(23a)
				iency in %						, (,			0.5 76.5	(23c)
			-	entilation	-					2h)m + (23b) x [1 – (23c)		(200)
(24a)m=		0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(24a)
		d mech	ı anical ve	entilation	without	heat rec	L Coverv (N	и ЛV) (24b	m = (2)	1 2b)m + (1 23b)			
(24b)m=		0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	use ex	tract ver	ntilation c	or positiv	ve input v	ventilatic	n from o	utside	ļ	Į			
,				hen (24a	•	•				.5 × (23t)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,				ole hous m = (22t	•	•				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. He	at losse	s and he	eat loss i	paramete	er:									
ELEN		Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²·I		A X k kJ/K
Doors			、 ,			2.1	x	1.2	=	2.52	,			(26)
Window	ws Type	e 1				6.649) x1/	/[1/(0.9)+	0.04] =	5.78				(27)
	ws Type					3.035		/[1/(0.9)+	0.04] =	2.64	=			(27)
Floor	,					49.44		0.1		4.9444	 [(28)
Walls 1	Tvpe1	27.2	26	9.68		17.58		0.15		2.64			\dashv	(29)
Walls 1		20.8		2.1	=	18.71		0.14		2.65	= 1		\dashv	(29)
		elements				97.51		0.11		2.00	L			(31)
Party v			,			29.03		0		0	r			(32)
Party c						49.44		0		0	L 		\dashv	(32b)
* for win	dows and			effective wil		alue calcula		formula 1	/[(1/U-valı	ue)+0.04] a	L as given in	paragraph	 1 3.2	(320)
			= S (A x		s and part			(26)(30)	+ (32) =				21.16	(33)
		Cm = S(•	•)						(30) + (3	2) + (32a).	(32e) =	8675	(34)
			· ,	⁻ = Cm ÷	- TFA) in	∩ kJ/m²K				ative Value			250	(35)
For desi	gn assess	sments wh		tails of the				ecisely the	e indicative	e values of	f TMP in Ta	able 1f		` ` `
Therma	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix k	<						4.22	(36)
			are not kn	nown (36) =	- 0.05 x (3	1)								
	abric he									- (36) =			25.38	(37)
Ventila	tion hea	r	1	d monthly				1		i = 0.33 × ((25)m x (5))	I	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(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)
		coefficie	· ·				_		· · ·	i = (37) + (1	-	I	
(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		
Stroma F	-SAP 201	2 Version	: 1.0.5.16	(SAP 9.92)	- http://ww	ww.stroma	.com			Average =	sum(39)₁	12/12=	35.5p2	<u>age 2 o^{f39)}</u>

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:	
if TF				: [1 - exp	(-0.0003	849 x (TF	-13.9)2)] + 0.0)013 x (1	ΓFA -13.	1. 9)	67]	(42)
Reduce	the annua	l average	hot water	usage by		lwelling is	designed t	(25 x N) to achieve		se target o		.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		Vd,m = fa	ctor from T	Table 1c x						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		
_							_				m(44) ₁₁₂ =		887.42	(44)
Energy c	ontent of	hot water	used - cal	culated me	onthly = 4.	190 x Vd,r		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		
lf instanta	aneous w	ater heatii	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46		Fotal = Su	m(45) ₁₁₂ =		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)
	storage												1	
•		. ,					-	within sa	ame vess	sel	(0		(47)
		-			/elling, e			. ,			47)			
	storage		not wate	er (this ir	iciudes i	nstantar	ieous co	mbi boil	ers) ente	er u in (47)			
	-		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)
				•	loss fact								1	
		•	factor fr ee secti		le 2 (kW	h/litre/da	ıy)				0.	02		(51)
		from Ta		011 4.5							1.	03	1	(52)
			m Table	2b							0			(52)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =	1.	03		(54)
0.		54) in (5	•									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)
					,	,	. ,	65 × (41)						
· .	i		1	i	i	1	1	ng and a	-		· · ·		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	lculated	for eac	h m	nonth (61)m =	(60)) ÷ 36	65 × (41))m								
(61)m=	0	0	0		0	0		0	0	0		0	0	0	C)		(61)
Total h	eat req	uired for	water ł	nea	iting ca	lculated	l fo	r each	n month	(62)	m =	0.85 × ((45)m +	(46)m +	(57)	m +	(59)m + (61)m	
(62)m=	175.91	155.44	164.15	1	148.41	146.35	1:	32.09	128.1	138	.85	138.06	153.83	161.08	172	2.1		(62)
Solar DH	IW input	calculated	using Ap	pen	dix G or	Appendix	н ((negativ	ve quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	er hea	iting)		
(add ad	dditiona	al lines if	FGHR	Sai	nd/or V	VWHRS	ap	oplies,	see Ap	penc	lix G	S)						
(63)m=	0	0	0		0	0		0	0	0		0	0	0	C)		(63)
Output	from w	ater hea	ter															
(64)m=	175.91	155.44	164.15	1	148.41	146.35	1:	32.09	128.1	138	.85	138.06	153.83	161.08	172	2.1		_
											Outp	out from wa	ater heate	er (annual)₁	12		1814.38	(64)
Heat g	ains fro	m water	heating	g, k	Wh/mc	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	(46)m	+ (57)m	+ (5	9)m]	
(65)m=	84.33	75.02	80.42		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	of	(65)m	only if c	ylir	nder is	s in the c	dwell	ing	or hot w	ater is f	rom com	mun	ity h	eating	
5. Int	ernal g	ains (see	e Table	5 a	and 5a)	:												
Metabo	olic gair	ns (Table	e 5), Wa	atts														
	Jan	Feb	Mar		Apr	Мау		Jun	Jul	A	ug	Sep	Oct	Nov	D	ec		
(66)m=	83.69	83.69	83.69		83.69	83.69	8	33.69	83.69	83.	69	83.69	83.69	83.69	83.	69		(66)
Lightin	g gains	(calcula	ted in A	٨pp	endix l	_, equat	ion	L9 or	⁻ L9a), a	lso s	ee ⁻	Table 5						
(67)m=	13.12	11.65	9.48		7.17	5.36	4	4.53	4.89	6.3	6	8.54	10.84	12.65	13.	48		(67)
Appliar	nces ga	ins (calc	ulated	in A	Append	lix L, eq	uat	tion L'	13 or L1	3a), a	also	see Ta	ble 5	-	-			
(68)m=	145.79	147.3	143.49	1	135.37	125.13	1	15.5	109.07	107	.56	111.37	119.48	129.73	139	.36		(68)
Cookin	g gains	s (calcula	ted in A	Αрр	endix	L, equat	ior	L15 ו	or L15a)	, als	o se	e Table	5	-	-			
(69)m=	31.37	31.37	31.37		31.37	31.37	3	31.37	31.37	31.	37	31.37	31.37	31.37	31.	37		(69)
Pumps	and fa	ns gains	(Table	5a)													
(70)m=	0	0	0	Τ	0	0		0	0	0		0	0	0	C)		(70)
Losses	e.g. ev	, vaporatio	n (nega	ativ	e value	es) (Tab	le	5)						•				
(71)m=	-66.95	-66.95	-66.95	Τ-	-66.95	-66.95	-6	66.95	-66.95	-66.	.95	-66.95	-66.95	-66.95	-66	.95		(71)
Water	heating	, gains (T	Table 5)											•				
(72)m=	113.35	111.64	108.09	1	103.27	100.14	9	95.73	91.98	96.	79	98.49	103.48	109.12	111	.65		(72)
Total i	nterna	l gains =	:					(66)	m + (67)m	1 + (68	3)m +	+ (69)m + ((70)m + (1	71)m + (72))m			
(73)m=	320.37	318.7	309.17	2	293.93	278.74	20	63.87	254.05	258	.81	266.5	281.91	299.6	312	2.6		(73)
6. Sol	ar gain	s:	1											1	•			
Solar g	ains are	calculated	using sol	ar fl	ux from	Table 6a	and	associ	ated equa	tions	to co	nvert to th	e applica	ble orientat	tion.			
Orienta		Access F			Area			Flu			-	g	_	FF			Gains	
		Table 6d			m²			Tat	ole 6a		Т	able 6b		able 6c			(W)	_
Southea	ast <mark>0.9</mark> x	0.77	2	< [3.0	4	x	3	6.79	x		0.35	x	0.8		=	21.67	(77)
Southea	ast <mark>0.9x</mark>	0.77	2	< [3.0	4	x	6	2.67	x		0.35	x	0.8		=	36.91	(77)
Southea	ast <mark>0.9x</mark>	0.77		< [3.0	4	x	8	5.75	x		0.35	×	0.8		=	50.5	(77)
Southea	ast <mark>0.9x</mark>	0.77	3	< [3.0	4	x	1(06.25	x		0.35	×	0.8		=	62.57	(77)
Southea	ast <mark>0.9x</mark>	0.77	;	< [3.0	4	x	11	19.01	x		0.35	×	0.8		=	70.09	(77)

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

	iputs inion	neu by	uevelop						0 0 0. 90 0.				
Southeast 0.9x	0.77	x	3.0	4	x	118.15	x	0.35	×	0.8	=	69.58	(77)
Southeast 0.9x	0.77	x	3.0	4	x	113.91	x	0.35	× [0.8	=	67.08	(77)
Southeast 0.9x	0.77	x	3.0	94	x	104.39	x	0.35	_ × [0.8	=	61.48	(77)
Southeast 0.9x	0.77	x	3.0	4	x	92.85	x	0.35	×	0.8	=	54.68	(77)
Southeast 0.9x	0.77	x	3.0	4	x	69.27	x	0.35	× [0.8	=	40.79	(77)
Southeast 0.9x	0.77	x	3.0	4	x	44.07	x	0.35	x	0.8	=	25.95	(77)
Southeast 0.9x	0.77	x	3.0	4	x	31.49	x	0.35	×	0.8	=	18.54	(77)
Southwest0.9x	0.77	x	6.6	5	x	36.79]	0.35	×	0.8	=	47.47	(79)
Southwest0.9x	0.77	x	6.6	5	x	62.67]	0.35	×	0.8	=	80.86	(79)
Southwest0.9x	0.77	x	6.6	5	x	85.75]	0.35	×	0.8	=	110.64	(79)
Southwest0.9x	0.77	x	6.6	5	x	106.25]	0.35	x	0.8	=	137.08	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	119.01]	0.35	×	0.8	=	153.54	(79)
Southwest0.9x	0.77	x	6.6	5	x	118.15]	0.35	×	0.8	=	152.43	(79)
Southwest0.9x	0.77	x	6.6	5	x	113.91]	0.35	×	0.8	=	146.96	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	104.39		0.35	× [0.8	=	134.68	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	92.85]	0.35	x	0.8	=	119.79	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	69.27		0.35	×	0.8	=	89.37	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	44.07		0.35	×	0.8	=	56.86	(79)
Southwest _{0.9x}	0.77	x	6.6	5	x	31.49		0.35	x	0.8	=	40.62	(79)
Solar gains in	1 1				000.04	011.01	r i	= Sum(74)m	1	00.04	50.47		(02)
(83)m= 69.14 Total gains – i		161.14 d solar	199.66 (84)m -	223.63 (73)m -	222.01	214.04	196	.16 174.48	130.16	82.81	59.17		(83)
(84)m= 389.5	<u> </u>	470.3	493.58	502.37	485.88	468.1	454	.96 440.98	412.07	382.42	371.76		(84)
		I			L	1	1		1				
7. Mean inter Temperature			\ U			from Tal		Th1 (°C)				24	(85)
Utilisation fac	-	• •			-		JIE 9,	IIII (C)				21	(03)
Jan	Feb	Mar	Apr	May	Jun	Jul		ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.97	0.92	0.81	0.65	0.46	0.33	0.3	<u> </u>	0.83	0.96	0.99		(86)
Mean interna													
(87)m= 20.54	<u> </u>	20.81	20.94	20.99	21	21 21	2	<u>/</u>	20.94	20.74	20.52		(87)
	ļļ								20.01	20.71	20.02		(-)
Temperature (88)m= 20.31	<u>г т</u> г	20.31	20.32	20.33	dwelling	20.34	20.	· · · · · ·	20.33	20.32	20.32		(88)
	ļļ						I	20.33	20.33	20.32	20.32		(00)
Utilisation fac	<u> </u>	1			· · ·	1	T Ó		0.70	0.05	0.00		(90)
(89)m= 0.98	0.96	0.9	0.78	0.6	0.41	0.28	0.3	3 0.49	0.79	0.95	0.99		(89)
Mean interna	<u> </u>	1			· ·	1	r –	1	r – – –			1	
(90)m= 19.71	19.89	20.09	20.26	20.32	20.34	20.34	20.3		20.27	20	19.68		(90)
									$\mathbf{f} = \mathbf{A} = \mathbf{I}$ is d	ng area ÷ (4	4)		L (n · r)
										ny area - (4	+) =	0.62	(91)

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	(92)
							<u> </u>						

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. Space hea	ating requ	uirement											
Set Ti to the			•		ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation	Feb	Mar	<u> </u>		lup	Jul	Aug	Son	Oct	Nov	Dee		
Jan Utilisation fac			Apr	May	Jun	Jui	Aug	Sep	OCI	Nov	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)
Useful gains	, hmGm ,	W = (94	1 4)m x (84	L 4)m	I	I							
(95)m= 382.18	1	428.3	393.9	, 315.94	213.84	144.44	150.9	232.08	333.94	364.87	366.32		(95)
Monthly aver	rage 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 rat	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]	-			
(97)m= 579.46		507.5	418.82	320.05	214.08	144.45	150.92	232.98	357.34	476.37	574.42		(97)
Space heatir	<u> </u>		i		1	I	<u> </u>	,	<u> </u>	r –			
(98)m= 146.77	95.62	58.92	17.95	3.06	0	0	0	0	17.4	80.28	154.83		
							Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	574.83	(98)
Space heatir	ng require	ement in	kWh/m ²	/year								11.63	(99)
9b. Energy re	quiremer	nts – Cor	mmunity	heating	scheme	;							
This part is us										unity scł	neme.		_
Fraction of sp	ace heat	from se	condary	/supplen	nentary I	heating	(Table 1'	1) '0' if n	one			0	(301)
Fraction of sp	ace heat	from co	mmunity	system	1 – (301	1) =						1	(302)
The community s	cheme may	v obtain he	at from or										
									up to four	other heat	sources; tl	he latter	
includes boilers, I Fraction of be		s, geothern	nal and wa	aste heat f					up to four	other heat	sources; ti		(3035)
Fraction of he	at from C	s, geothern Commun	nal and wa ity heat ∣	aste heat f pump	rom powe	r stations.						1	(303a)
	at from C	s, geothern Commun	nal and wa ity heat ∣	aste heat f pump	rom powe	r stations.				other heat 02) x (303			(303a) (304a)
Fraction of he	at from C al space	s, geotherr Commun heat froi	^{mal and wa} ity heat ∣ m Comn	aste heat f pump nunity he	rom power	r stations. D	See Apper	ndix C.	(3			1	
Fraction of he Fraction of tot	at from C al space trol and c	s, geotherr Commun heat froi charging	mal and wa ity heat m Comn method	aste heat f pump nunity he (Table -	rom power eat pump 4c(3)) fo	r stations. D r commi	See Apper unity hea	ndix C.	(3			1	(304a)
Fraction of he Fraction of tot Factor for con	at from C al space trol and c ss factor	s, geotherr Commun heat froi charging	mal and wa ity heat m Comn method	aste heat f pump nunity he (Table -	rom power eat pump 4c(3)) fo	r stations. D r commi	See Apper unity hea	ndix C.	(3			1 1 1	(304a) (305) (306)
Fraction of he Fraction of tot Factor for con Distribution lo	at from C al space trol and c ss factor	s, geotherr Commun heat froi charging (Table 1	nal and wa ity heat m Comn method 2c) for c	aste heat f pump nunity he (Table -	rom power eat pump 4c(3)) fo	r stations. D r commi	See Apper unity hea	ndix C.	(3			1 1 1 1.05	(304a) (305) (306)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin	at from C al space trol and c ss factor g heating	s, geotherr Commun heat froi charging (Table 1 requirem	mal and wa ity heat m Comn method 2c) for c nent	aste heat f pump nunity he (Table - commun	rom power eat pump 4c(3)) fo	r stations. D r commi	See Apper unity hea	ndix C. hting sys	(3 tem		a) =	1 1 1.05 kWh/yea	(304a) (305) (306)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro	at from C al space trol and c ss factor g heating om Comr	s, geotherr Commun heat froi charging (Table 1 requirem nunity he	mal and wa ity heat m Comn method (2c) for c nent eat pum	aste heat f pump nunity he (Table - commun	rom power eat pump 4c(3)) fo ity heatin	r stations. D Ir commi	See Apper unity hea m	ndix C. hting sys (98) x (30	(3 tem 04a) x (30	02) x (303 5) x (306) :	a) =	1 1 1.05 kWh/yea 574.83 603.57	(304a) (305) (306) ar (307a)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s	at from C al space trol and c ss factor g heating om Comr secondary	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei	mal and wa ity heat m Comn method (2c) for c nent eat pum mentary	aste heat f pump nunity he (Table - commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table	ndix C. hting sys (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	02) x (303 5) x (306) ÷ ∶ E)	a) =	1 1 1.05 kWh/yea 574.83 603.57 0	(304a) (305) (306) ar (307a) (308
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fre	at from C al space trol and c ss factor g heating om Comr secondary	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei	mal and wa ity heat m Comn method (2c) for c nent eat pum mentary	aste heat f pump nunity he (Table - commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table	ndix C. hting sys (98) x (30 e 4a or A	(3 tem 04a) x (30	02) x (303 5) x (306) ÷ ∶ E)	a) =	1 1 1.05 kWh/yea 574.83 603.57	(304a) (305) (306) ar (307a)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s	at from C al space trol and c ss factor heating heating om Comr secondary g requirer g	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei ment froi	mal and wa ity heat p m Comm method (2c) for c nent eat pum mentary m secon	aste heat f pump nunity he (Table - commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table	ndix C. hting sys (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	02) x (303 5) x (306) ÷ ∶ E)	a) =	1 1 1.05 kWh/yea 574.83 603.57 0	(304a) (305) (306) ar (307a) (308
Fraction of he Fraction of tot Factor for com Distribution lo Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating	at from C al space trol and c ss factor g heating r com Comr secondary g requirer g heating r communit	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei ment froi equirem	mal and wa ity heat m Comn method (2c) for c hent eat pum mentary m secon ent he:	aste heat f pump nunity he (Table - commun p heating dary/su	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table	ndix C. (98) x (30 e 4a or A (98) x (30	(3 tem 04a) x (30 ppendix 01) x 100	02) x (303 5) x (306) ÷ ∶ E)	a) = =	1 1 1.05 kWh/yea 574.83 603.57 0 0	(304a) (305) (306) ar (307a) (308
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c	at from C al space trol and c ss factor g heating r becondary g requirer g heating r communit	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei ment froi equirem ty schem nunity he	mal and wa ity heat m Comn method (2c) for c hent eat pum mentary m secon ent he: eat pump	aste heat f pump nunity he (Table - commun p heating dary/su	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table tem	(98) x (30 (98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	02) x (303 5) x (306) = ÷ (308) = 5) x (306) =	a) = =	1 1 1.05 kWh/yea 574.83 603.57 0 0 0 1814.38 1905.1	(304a) (305) (306) ar (307a) (308 (309) (309)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c Water heat fro Electricity use	at from C al space trol and c ss factor g heating r becondary g requirer g heating r communit com Comn ad for hea	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei ment froi equirem ty schem nunity he it distribu	mal and wa ity heat m Comn method (2c) for c hent eat pum mentary m secon ent he: eat pump ution	aste heat f pump nunity he (Table - commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system	r stations. o ng syste in % (fro	See Apper unity hea m om Table tem	(98) x (30 (98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	02) x (303 5) x (306) = : E) : (308) =	a) = =	1 1 1.05 kWh/yea 574.83 603.57 0 0 0 1814.38 1905.1 25.09	(304a) (305) (306) ar (307a) (307a) (308 (309) (309)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c Water heat fro Electricity use Cooling Syste	at from C al space trol and c ss factor g heating r becondary g requirer g heating r communit om Comm ad for hea em Energ	s, geotherr Commun heat froi charging (Table 1 requirem nunity he y/supplei ment froi equirem ty scherr nunity he it distribu y Efficiei	mal and wa ity heat m Comn method (2c) for c hent eat pum mentary m secon ent he: eat pump ution ncy Ratio	aste heat f pump nunity he (Table - commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system oplemen	r stations. o r commi ng syste in % (fro tary sys	See Apper unity hea m om Table tem 0.01	(98) x (30 (98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	02) x (303 5) x (306) = ÷ (308) = 5) x (306) =	a) = =	1 1 1.05 kWh/yea 574.83 603.57 0 0 0 1814.38 1905.1	(304a) (305) (306) ar (307a) (307a) (308 (309) (310a) (313) (314)
Fraction of he Fraction of tot Factor for con Distribution lo Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from c Water heat fro Electricity use	at from C al space atrol and c ss factor beating beating com Comr secondary g requirer g heating r communit on Comn ad for heat em Energ g (if there	s, geotherr Commun heat froi charging (Table 1 requirem nunity he v/suppled ment froi equirem ty scherr nunity he it distribu y Efficien is a fixe	mal and wa ity heat m Comm method (2c) for c hent eat pum mentary m secon ent he: eat pump ution ncy Ratio d cooling	aste heat f pump nunity he (Table - commun p heating dary/sup o g system	n, if not e	r stations. D r commi ng syste in % (fro tary sys	See Apper unity hea m om Table tem 0.01	ndix C. (98) x (30 e 4a or A (98) x (30 (64) x (30 x [(307a).	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	02) x (303 5) x (306) = ÷ (308) = 5) x (306) =	a) = =	1 1 1.05 kWh/yea 574.83 603.57 0 0 1814.38 1905.1 25.09 0	(304a) (305) (306) ar (307a) (308 (309) (310a) (313)

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) =		135.14	(331)
Energy for lighting (calculated in Append	dix L)				231.69	(332)
Total delivered energy for all uses (307)	+ (309) + (310)	+ (312) + (315) + (331) + (332	2)(237b) =		2875.5	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)	• •	ot CHP) CHP using two fuels repeat (363) to (366) for the second	d fuel	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 s	ystems	(363)(366) + (368)(372))	=	338.52	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	ion heater or in	stantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			338.52	(376)
CO2 associated with electricity for pump	os and fans with	in dwelling (331)) x	0.52	=	70.14	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52	=	120.25	(379)
Total CO2, kg/year	sum of (376)(38	2) =			528.9	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				10.7	(384)
El rating (section 14)					92.5	(385)

roject Informat	ion:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details				
	G DESIGN STAGE		Total Floor Area: 6	2.73m²
ite Reference :	BP Finchley Roa	nd	Plot Reference:	205 BP Finchley Rd
ddress :	205 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame: ddress :				
•		within the SAP calculations. ations compliance.		
a TER and DE				
	ating system: Electric	city (c)		
uel factor: 1.55				
-	ioxide Emission Rate	. ,	24.58 kg/m ²	
-	Dioxide Emission R	ate (DER)	9.55 kg/m ²	OK
Ib TFEE and D		E)	39.4 kWh/m ²	
-	ergy Efficiency (TFE Energy Efficiency (DI		30.9 kWh/m ²	
	Thergy Eniciency (Di		30.9 KVVII/III-	ОК
2 Fabric U-valu	es			
Elemen	t	Average	Highest	
External	wall	0.15 (max. 0.30)	0.15 (max. 0.70)	ОК
Party wa	all	0.00 (max. 0.20)	-	ОК
Floor		(no floor)		
Roof		(no roof)		
Opening	ļs	0.96 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal brid				
Thermal Air permeabil		from linear thermal transmittan	ces for each junction	
-	ability at 50 pascals		3.00 (design valu	le)
Maximum	inty at so passale		10.0	OK
4 Heating effici	ency			
	ing system:	Community heating scheme	es - Heat pump	
Secondary	/ heating system:	None		
5 Cylinder insu	lation			
	Storage:	No cylinder		
6 Controls				

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 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		

Project Informati	on:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details				
EW DWELLING	DESIGN STAGE		Total Floor Area: 9	2.67m²
ite Reference :	BP Finchley Roa	d	Plot Reference:	G04 BP Finchley Rd
ddress :	G04 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame: ddress :				
•		within the SAP calculations. ations compliance.		
1a TER and DE	R			
	ting system: Electric	city (c)		
uel factor: 1.55 (
•	oxide Emission Rate		23.5 kg/m ²	014
welling Carbon 1b TFEE and Di	Dioxide Emission Ra	ate (DER)	8.85 kg/m²	OK
	ergy Efficiency (TFE	E)	46.4 kWh/m ²	
-	inergy Efficiency (DF		33.4 kWh/m²	
			00.4 KWM/M	ОК
2 Fabric U-valu	es			
Element	t	Average	Highest	
External	wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof		(no roof)		
Opening		0.93 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal bric	0 0			
		from linear thermal transmittan	ces for each junction	
3 Air permeabil			2 00 (decime vol	
Maximum	ability at 50 pascals		3.00 (design valu 10.0	OK
			10.0	ON
4 Heating efficient		Community heating ochom		
Main Heat	ing system:	Community heating scheme	es - Heat pump	
Secondary	heating system:	None		
5 Cylinder insu	lation			
	Storage:	No cylinder		
Hot water				
Hot water 3 6 Controls				
6 Controls				
6 Controls	ting controls	Charging system linked to u No cylinder thermostat	ise of community heating, p	rogrammer and TRVs OK

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 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based 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		

DER WorkSheet: New dwelling design stage

			User D	etails:						
Assessor Name: F	lobyn Beri	ry		Strom	a Num	ber:		STRO	036659	
Software Name:	troma FS	AP 2012		Softwa	are Ver	sion:		Versic	on: 1.0.5.16	
		P	roperty /	Address	: 401 BP	Finchle	y Rd			
		hley Rd, Londo	n, NW3 (5EY						
1. Overall dwelling dimensi	ons:									
Ground floor				a(m²) 9.38	(1a) x	Av. He	ight(m) .54	(2a) =	Volume(m ³) 125.44) (3a)
Total floor area TFA = (1a)+	(1b)+(1c)+((1d)+(1e)+(1ı	ר) 4	9.38	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	125.44	(5)
2. Ventilation rate:				- 4		4 - 4 - 1				
	main heating	seconda heating	У	other		total			m ³ per hou	r
Number of chimneys	0	+ 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0	+ 0	+	0	=	0	x 2	20 =	0	(6b)
Number of intermittent fans					- <u> </u>	0	x ′	10 =	0	(7a)
Number of passive vents						0	x ^	10 =	0	(7b)
Number of flueless gas fires						0	x 4	40 =	0	 (7c)
								Air ch	anges per ho	our
Infiltration due to chimneys,	flues and fa	ans = (6a)+(6b)+(7	7a)+(7b)+(7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has been	carried out or	is intended, procee	d to (17), c	otherwise o	continue fro	om (9) to ((16)			
Number of storeys in the o	lwelling (ns	5)							0	(9)
Additional infiltration	for atopl or	timber from a	0.25 for			uction	[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.25 if both types of wall are prese deducting areas of openings),	nt, use the val	lue corresponding to			•	uction			0	(11)
If suspended wooden floo	, enter 0.2	(unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, enter									0	(13)
Percentage of windows ar	d doors dra	aught stripped		0.05 10.0		0.01			0	(14)
Window infiltration				0.25 - [0.2 (8) + (10)		1	. (15) -		0	(15)
Infiltration rate Air permeability value, q50		d in cubic metre						area	0	(16) (17)
If based on air permeability	•		•	•	•		invelope	alea	3 0.15	(17)
Air permeability value applies if a						is being us	sed		0.13	
Number of sides sheltered									3	(19)
Shelter factor				(20) = 1 -		9)] =			0.78	(20)
Infiltration rate incorporating				(21) = (18)) x (20) =				0.12	(21)
Infiltration rate modified for r	<u> </u>							_	1	
Jan Feb Ma	i	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind speed	- I I				. I				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	J	
Wind Factor (22a)m = (22)m		I	r	I			1		1	
(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	J	

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			
	<i>ate ettec</i> echanica		change i	rate for ti	he appli	cable ca	se						0.5	<i>(</i> '	23a)
			using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (N	√5)) , othe	rwise (23b) = (23a)			0.5		23b)
lf bala	anced with	heat reco	overy: effici	ency in %	allowing f	or in-use fa	actor (from	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)		(,
(24a)m=	r i	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2	24a)
b) If	balance	d mecha	anical ve	ntilation	without	heat rec	overy (N	и ЛV) (24b)m = (22	1 2b)m + (23b)		1		
(24b)m=	· · · · ·	0	0	0	0	0	0	0	0	0	0	0		(2	24b)
c) If	whole ho	ouse ex	tract ven	tilation c	or positiv	e input v	/entilatic	n from c	outside	!	<u>.</u>		1		
i	f (22b)m	า < 0.5 ×	(23b), t	hen (24c	c) = (23b); otherv	vise (24	c) = (22k	o) m + 0.	.5 × (23t)				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(2	24c)
,			on or when (24d)		•	•				0.5]					
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(2	24d)
Effe	ctive air	change	rate - en	iter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)	-	-	-			
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.25	0.25		(2	25)
3. He	at losses	s and he	eat loss p	paramete	er:										
ELEN		Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²·I		A X k kJ/K	
Doors			、			2.1	x	1.2	=	2.52	,			(2	26)
Window	ws Type	1				4.584	x1/	/[1/(0.9)+	0.04] =	3.98	\exists			(2	27)
	ws Type					2.936	; x1,	/[1/(0.9)+	0.04] =	2.55	=) (i	27)
Walls 7		38.3	37	7.52		30.85		0.15		4.63				`	, 29)
Walls 1		23.8		2.1	=	21.76		0.14		3.08	= 1		\exists		29)
Roof		49.3		0	=	49.38		0.1		4.94	= 1		\exists		30)
Total a	rea of el					111.6		0.1			L				31)
Party v			,			18.73		0		0	r				32)
Party f						49.38		0		0	L 		\dashv		32a)
* for win	dows and		ows, use e sides of in			alue calcula		formula 1	/[(1/U-valı	ıe)+0.04] a	L as given in	paragraph	L 1 3.2	(520)
			= S (A x		o ana par			(26)(30)	+ (32) =				21.7	(;	33)
	apacity (•	,					((28).	(30) + (3	2) + (32a).	(32e) =	6419.4		34)
Therma	al mass	parame	ter (TMF	• = Cm ÷	- TFA) in	n kJ/m²K			Indica	itive Value	: Medium		250		35)
	•		ere the de tailed calcu		constructi	ion are not	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f			
Therma	al bridge	es : S (L	x Y) cale	culated u	using Ap	pendix ł	<						5.03	(;	36)
			are not kn	own (36) =	: 0.05 x (3	1)									
	abric hea									· (36) =			26.73	3(3	37)
Ventila	i i		alculated	i						= 0.33 × (1	_	1		
(20)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Nov	Dec		1.	38)
(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	(.	<i>JU)</i>
1	ansfer c		· · · · · ·	20.00	20.77	20.40	20.40	20.04	- · ·	= (37) + (· ·	27.05	1		
(39)m=	37.73	37.61	37.49	36.89	36.77	36.16	36.16	36.04	36.4	36.77 Average =	37.01	37.25	26.96	Sage 2 of	30)
Stroma H	-SAP 2012	∠ version:	: 1.0.5.16 (SAP 9.92)	- nπp://ww	ww.stroma	.com			woraye =	Jun(33)1	12714-	50.0	<u>rage 2 of </u>	71

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	r of dav	s in mo	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)
L	I		<u> </u>	ļ		<u> </u>	<u> </u>							
4. Wa	ter heat	ing enei	rgy requ	irement:								kWh/ye	ear:	
if TF/				: [1 - exp	(-0.0003	849 x (TF	-13.9)2)] + 0.0)013 x (1	ΓFA -13.	1. 9)	67		(42)
Reduce t	the annua	l average	hot water	usage by		lwelling is	designed t	(25 x N) to achieve		se target o	73 f	.91		(43)
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	r usage ir	n litres per	day for ea		Vd,m = fa		Table 1c x							
(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		
L											m(44) ₁₁₂ =		886.92	(44)
Energy c r	ontent 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=	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 instanta	aneous w	ater heatii	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46		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 s	storage	loss:												
Storage	e volum	e (litres)	includir	ng any so	olar or W	/WHRS	storage	within sa	ame vess	sel	(0		(47)
		-			velling, e			. ,	`	(0)	(-)			
	ise it no storage		hot wate	er (this ir	ICludes I	nstantar	ieous co	mbi boil	ers) ente	er '0' in (47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/dav):					0		(48)
,			m Table			,	, , , , , , , , , , , , , , , , , , ,					0		(49)
				, kWh/ye	ear			(48) x (49)) =			10		(50)
b) If m	anufact	urer's de	eclared of	cylinder	oss fact									
		•			e 2 (kW	h/litre/da	ıy)				0.	02		(51)
		eating s from Ta	ee secti ble 2a	on 4.3							1.	02	l	(52)
			m Table	2b							0.			(52)
				, kWh/ye	ear			(47) x (51)	x (52) x (5	53) =	1.			(54)
		54) in (5	•	, ,								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	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	/ circuit	loss (ar	nual) fro	om Table	e 3						(0		(58)
Primary	/ circuit	loss cal	culated	for each	month (,	. ,	65 × (41)					-	
· r	i		1	· · · · · ·	1	1	1	ng and a	-		· · ·		1	
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	lculated	for eacl	n month	(61)m =	(60) ÷ 365	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 foi	r each i	month	(62)r	n =	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	.8	138.02	153.78	161.02	172	.04		(62)
Solar DH	IW input	calculated	using Ap	pendix G o	r Appendix	: H (negative	quantity) (ente	er '0'	if no sola	r contribut	tion to wate	er hea	ting)	I	
(add ad	dditiona	I lines if	FGHRS	and/or	WWHRS	ар	plies, s	see Ap	pend	ix G	6)						
(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	138.02	153.78	161.02	172	.04		_
									(Outp	ut from wa	ater heate	<mark>r (annual)</mark> 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 x	(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	ylin	nder is i	in the c	lwelli	ing	or hot w	ater is f	rom com	mun	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	Αι	Jg	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 L	_9a), al	lso se	ee T	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	uati	ion L13	3 or L1:	3a), a	also	see Ta	ble 5	-	-		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	g gains	(calcula	ted in A	ppendix	L, equat	ion	L15 or	r L15a)	, also	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	e.g. ev	/aporatio	n (nega	ative valu	les) (Tab	le 5	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	+ (68)m +	· (69)m + ((70)m + (7	'1)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	ar gain	S:		•	•							_					
Solar g	ains are	calculated	using sola	ar flux from	Table 6a	and	associat	ed equa	tions t	0 CO	nvert to th	e applical	ole orientat	tion.			
Orienta		Access F		Area			Flux	•		-	g_	-	FF			Gains	
	_	Table 6d		m²		_	Table	e 6a	_		able 6b		able 6c			(W)	_
Southea	ast <mark>0.9x</mark>	0.77	×	2.9	94	x [36.	79	x		0.35	×	0.8		=	20.96	(77)
Southea	L	0.77	×	2.9	94	× [62.	67	x		0.35	x	0.8		=	35.71	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.9	94	× [85.	75	x		0.35	x	0.8		=	48.85	(77)
Southea	ast <mark>0.9x</mark>	0.77	×	2.9	94	× [106	.25	x		0.35	x	0.8		=	60.53	(77)
Southea	ast <mark>0.9</mark> x	0.77	×	2.9	94	x [119	.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.

Result	s and in	puts into	ormed k	эу	develop	per de	clara	ation. I	Any dev	latior	n is c	certain to	o outpi	lt ameren	t res	uits.		
Southea	ast <mark>0.9x</mark>	0.77	:	x	2.9	4	x	1	18.15	x		0.35	×	0.8		=	67.31	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	1	13.91	x		0.35	×	0.8		=	64.89	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	1	04.39	x		0.35	×	0.8		=	59.47	(77)
Southea	ast <mark>0.9x</mark>	0.77	:	x	2.9	4	x	9	92.85	x		0.35	×	0.8		=	52.9	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	2.9	4	x	6	69.27	x		0.35	×	0.8		=	39.46	(77)
Southea	ast <mark>0.9x</mark>	0.77	:	x	2.9	4	x		14.07	x		0.35	×	0.8		=	25.11	(77)
Southea	ast <mark>0.9x</mark>	0.77		x	2.9	4	x		31.49	x		0.35	×	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	×	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	×	0.8		=	28.01	(79)
(83)m=	53.69	watts, ca 91.45 nternal a	125.13	5	155.04	173.66	6	172.4	166.21	<mark>(83)</mark> m 152		u <mark>m(74)</mark> m . 135.49	<mark>(82)m</mark> 101.07	7 64.31	45.	.95		(83)
(84)m=	374.41	410.45	434.5	-	449.08	452.45	<u> </u>	436.3	, watts 420.32	411	24	402.19	383.2	7 364.26	358	02		(84)
				_				430.3	420.32	411	.24	402.19	303.2	304.20	350	.92		(04)
		nal temp							·		-					ſ		
		during h								ole 9	, I n'	r (°C)					21	(85)
Utilisa		tor for ga					T		<u> </u>			Sep	Oct	Nov				
(86)m=	Jan 0.99	Feb 0.98	Mar 0.95	╉	Apr 0.88	May 0.73	_	Jun 0.53	Jul 0.38	0.	ug ⊿	0.62	0.88	0.97	0.9	ec		(86)
		l tempera		 h									0.00	0.01	0			(00)
(87)m=	20.47	20.58	20.73	-	20.89	20.97	<u> </u>	21	21	2		20.99	20.91	20.67	20.	45		(87)
				-		reato			L									
(88)m=	20.28	during h 20.29	20.29	pe T	20.3	20.3	-	20.31	20.31	20.	- 1	20.31	20.3	20.3	20.	20		(88)
							_					20.01	20.0	20.0	20.	20		()
		tor for ga		r re			-		1	r Ó	- A	0.50	0.04	0.07		20		(89)
(89)m=	0.99	0.97	0.94		0.85	0.68	_	0.47	0.32	0.3		0.56	0.84	0.97	0.9	19		(09)
		l tempera		n th			_		1	r –			,	1	<u> </u>			
(90)m=	19.58	19.75	19.96		20.18	20.28		20.31	20.31	20.	.31	20.3	20.2	19.89	19.	56	a	(90)
												1		/ing area ÷ (+, =		0.62	(91)

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

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

(92)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	(92)	

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

Nesuits and in	puls informed	by develo	per ueci	aration. I	Any devi	101113	Jeriann i	o output	umeren	1000110.		
(93)m= 20.13	20.27 20.4	4 20.62	20.71	20.74	20.74	20.74	20.73	20.64	20.37	20.11		(93)
8. Space hea	ting requireme	ent										
	mean internal	•		ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
	factor for gair		1		<u> </u>		0	0.1		D	l	
Jan	Feb Ma		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m= 0.99	tor for gains, l	-	0.71	0.51	0.36	0.38	0.59	0.86	0.97	0.99		(94)
	hmGm , W =			0.51	0.30	0.38	0.59	0.00	0.97	0.99		(04)
(95)m= 369.12	399.18 409.0	<u> </u>	321.13	221.14	149.6	156.31	239.02	330.03	352.21	354.9		(95)
	age external to				140.0	100.01	200.02	000.00	002.21	004.0		()
(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)
	e for mean inte											, ,
(97)m= 597.32	577.86 522.5		331.25	221.92	149.65	156.39	241.4	369.04	491.21	592.58		(97)
	g requirement	for each r	nonth, k	ı Wh/mon	1 = 0.02	1 24 x [(97])m – (95)m] x (4	1)m			
(98)m= 169.78	120.07 84.4	- i	7.53	0	0	0	0	29.03	100.08	176.83		
	II	!	!	<u> </u>	<u> </u>	I Tota	l per year	(kWh/yea	L r) = Sum(9	8)15,912 =	720.75	(98)
Space heatin	g requirement	in $kM/b/m$	2/voor								14.50	(99)
	• •		•								14.59	(99)
9b. Energy rec												
This part is us Fraction of spa									unity scł	neme.	0	(301)
		-			-		1) 0 11 11	UIIE			0	
Fraction of spa	ace heat from	community	y system	1 - (30)	1) =						1	(302)
The community so	-							up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea				from powe	r stations.	See Appel	ndix C.				1	(303a)
		-			_			(0		- 1		
Fraction of tota			•						802) x (303	a) =	1	(304a)
Factor for cont	rol and chargi	ng methoo	d (Table	4c(3)) fo	or commu	unity hea	iting sys	tem			1	(305)
Distribution los	s factor (Tabl	e 12c) for	commun	ity heati	ng syste	m					1.05	(306)
Space heating	a										kWh/yea	ur
Annual space	-	ement									720.75	
Space heat fro	om Community	heat our	מו				(98) x (30	04a) x (30	5) x (306) :	=	756.79	(307a)
	-	-	•	avetam	in 0/ (fre	m Tabla						(308
Efficiency of se		-	-						,		0	
Space heating	requirement	rom secor	ndary/su	pplemen	tary sys	tem	(98) x (30	01) x 100	÷ (308) =		0	(309)
Water heating	1											
Annual water		ement									1813.74	
If DHW from c	ommunity sch	eme:										
Water heat fro	m Community	heat pum	р				(64) x (30	03a) x (30	5) x (306)	=	1904.42	(310a)
Electricity use	d for heat disti	ibution				0.01	× [(307a).	(307e) +	⊦ (310a)…((310e)] =	26.61	(313)
Cooling Syster	m Enerav Effic	iencv Rat	io								0	(314)
Space cooling		-		n if not i	anter (1)		= (107) ÷	(314) -			0	(315)
			• •		,		$=(107) \div$	(314) =			U	(315)
Electricity for p mechanical ve						outoido					400.54	(2200)
mechanical Ve	nulauon - Dala	nceu, exti	aur or po	suve in	բույլօպ	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)
Total delivered energy for all uses (307) + (30	9) + (310) + (312) + (315) + (331) + (332	2)(237b) =		3023.36	(338)
12b. CO2 Emissions – Community heating sc	eme				-
	- 57	Emission fact kg CO2/kWh	-	missions g 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 (3	66) for the second	fuel	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 system	(363)(366) + (368)(372)		=	359.1	(373)
CO2 associated with space heating (seconda	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 h	eating (373) + (374) + (375) =			359.1	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	=	62.55	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	125.41	(379)
Total CO2, kg/year sum o	(376)(382) =			547.06	(383)
Dwelling CO2 Emission Rate (383)	(4) =			11.08	(384)
El rating (section 14)				92.23	(385)

roject Informat	ion:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Dwelling Details	:			
	DESIGN STAGE		Total Floor Area: 4	9.44m²
ite Reference :	BP Finchley Roa	d	Plot Reference:	G02 BP Finchley Rd
ddress :	G02 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame:				
ddress :		within the CAR colorylations		
-	ete report of regula	within the SAP calculations. ations compliance.		
a TER and DE	R			
	ting system: Electric	city (c)		
uel factor: 1.55				
-	oxide Emission Rate	. ,	28.64 kg/m ²	OK
b TFEE and D	Dioxide Emission Ra	ate (DER)	10.70 kg/m²	OK
	ergy Efficiency (TFE	E)	47.1 kWh/m²	
-	inergy Efficiency (DF		33.7 kWh/m²	
			00.7 КМИ/Ш	ОК
2 Fabric U-valu	es			
Elemen	t	Average	Highest	
External	wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof		(no roof)		
Opening	·	0.95 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal brid		· · · · · · · · · · · · ·	· · · ·	
Thermal Air permeabil		from linear thermal transmittan	ces for each junction	
	ability at 50 pascals		3.00 (design valı	le)
Maximum			10.0	ОК
4 Heating effici				
Main Heat	ing system:	Community heating scheme	s - Heat pump	
Secondary	heating system:	None		
5 Cylinder insu	lation			
Hot water		No cylinder		
6 Controls	J			
Space hea Hot water	ting controls controls:	Charging system linked to u No cylinder thermostat No cylinder	se 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%	ОК
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

roject Informati	ion:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details	:			
	DESIGN STAGE		Total Floor Area: 8	9.7m²
ite Reference :	BP Finchley Roa	d	Plot Reference:	306 BP Finchley Rd
ddress :	306 BP Finchley	Rd, London, NW3 5EY		
Client Details:				
ame:				
ddress :				
-		within the SAP calculations. ations compliance.		
a TER and DE	R			
	ting system: Electric	city (c)		
uel factor: 1.55 ((
-	oxide Emission Rate		23.22 kg/m ²	OK
b TFEE and D	Dioxide Emission R	ate (DER)	8.82 kg/m ²	OK
	ergy Efficiency (TFE	E)	43.0 kWh/m ²	
-	inergy Efficiency (D		32.8 kWh/m ²	
			02.0 ктил	ОК
2 Fabric U-valu	es			
Element	t	Average	Highest	
External	wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		(no floor)		
Roof		0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Opening		0.94 (max. 2.00)	1.20 (max. 3.30)	OK
a Thermal bric		7 11 11 11 11	· · · ·	
Thermal Air permeabil		from linear thermal transmittan	ces for each junction	
	ability at 50 pascals		3.00 (design valu	ie)
Maximum	asing at so passale		10.0	OK
4 Heating effici	ency			
	ing system:	Community heating scheme	es - Heat pump	
Secondary	heating system:	None		
5 Cylinder insu	lation			
Hot water	Storage:	No cylinder		
6 Controls				
Space hea	ting controls	Charging system linked to u	se of community heating, p	rogrammer and TRVs OK
Hot water	-	No cylinder thermostat No cylinder		

100.0%	
75.0%	OK
0.63	
1.5	OK
90%	
70%	OK
Medium	OK
Average or unknown	
10.44m ²	
1.53m ²	
2.00	
None	
3.0 m³/m²h	
3.0 m³/m²h 0.9 W/m²K	
0.9 W/m²K	
	75.0% 0.63 1.5 90% 70% Medium Average or unknown 10.44m ² 1.53m ² 2.00

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: 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) x 2.54 (2a) =	Volume(m ³) 183.14 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 72.1 (4)	
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$	183.14 (5)
2. Ventilation rate:	m3 nor hour
main secondary other total	m ³ per hour
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 $0 \times 10 =$	0 (7b)
Number of flueless gas fires 0 × 40 =	0 (7c)
Air ch	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 (9)
Additional infiltration [(9)-1]x0.1 = 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 Window infiltration $0.25 - [0.2 \times (14) \div 100] =$	0 (14)
	0 (15)
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area	0 (16) 3 (17)
If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$	3 (17) 0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	0.10
Number of sides sheltered	3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] =	0.78 (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$	0.12 (21)
Infiltration rate modified for monthly wind speed	1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Monthly average wind speed from Table 7	1
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7]
Wind Factor (22a)m = (22)m \div 4	1
(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	tion rat	e (allowir	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]		
	<i>ate ettec</i> echanica		change n	ate for ti	he appli	cable ca	se						0.5		(23a)
			using Appe	ndix N, (2	3b) = (23a) × Fmv (e	equation (N	N5)) , othe	rwise (23b	o) = (23a)			0.0		(23b)
			overy: efficie							, , ,			76.		(23c)
a) If	balance	d mecha	anical ve	ntilation	with hea	at recove	erv (MVH	HR) (24a	a)m = (2	2b)m + (23b) × [1 – (23c)			
(24a)m=	r	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 mecha	anical ve	ntilation	without	heat rec	covery (N	и ЛV) (24b)m = (2	1 2b)m + (23b)		1		
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
c) If	whole ho	ouse ex	tract ven	tilation c	r positiv	e input v	ventilatic	n from o	outside						
i	if (22b)m	< 0.5 ×	(23b), tł	nen (24c	;) = (23b); otherv	wise (24	c) = (22b	o) m + 0	.5 × (23b	o)				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
,			on or who en (24d)r							0.51					
(24d)m=	r`´r	0		$\frac{11}{0} = (22L)$			$\frac{40}{10} = 0$	0.5 + [(2 0.5)]			0	0]		(24d)
		-	rate - en		-		-			Ů	Ů	Ů	J		(- · /
(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)
								I	1	I	1	I	J		
		-	eat loss p			Not Ar	~~					le volue			(].
ELEN	IENI	Gros area		Opening m	0	Net Ar A ,n		U-val W/m2		A X U (W/		k-value kJ/m²·l		A X kJ/l	
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	5 x1/	/[1/(0.9)+	0.04] =	5.45					(27)
Walls -	Type1	54.4	9	12.86	;	41.64	L X	0.15	=	6.25					(29)
Walls 7	Туре2	30.5	58	2.1		28.48	3 X	0.14	=	4.03	- i		ΞĒ		(29)
Roof		72.	1	0		72.1	x	0.12	=	8.65	- i		ΞĒ		(30)
Total a	rea of el	ements	, m²			157.1	7								(31)
Party v	vall					13.1	x	0	=	0					(32)
Party f	loor					72.1					i		ΞĒ		(32a)
			ows, use ef sides of int				ated using	formula 1	/[(1/U-valu	ue)+0.04] a	as given ir	n paragraph	n 3.2		-
			= S (A x I		s anu part	1110115		(26)(30)) + (32) =				32.6	32	(33)
	apacity C		•	- /						(30) + (3	2) + (32a)	(32e) =	8329		(34)
			ter (TMP	= Cm ÷	TFA) in	ı kJ/m²K			Indica	ative Value	: Medium		250		(35)
			ere the det					ecisely the	e indicative	e values of	f TMP in T	able 1f			
			tailed calcu												_
	-	•	x Y) calc		• •	-	<						5.7	6	(36)
	of thermal		are not kno	own (36) =	0.05 x (3	1)			(33) +	- (36) =			38.3	38	(37)
			alculated	monthly	,					i = 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(38)m=	16.06	15.88	15.71	14.83	14.65	13.78	13.78	13.6	14.13	14.65	15.01	15.36	1		(38)
Heat tr	ansfer co	oefficier	nt, W/K	I					(39)m	i = (37) + (38)m	•			
(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			
Stroma I	FSAP 2012	2 Version:	1.0.5.16 (SAP 9.92)	- http://ww	vw.stroma	.com			Average =	Sum(39)	112 /12=	53.1	1øage 2	<mark>(3∕9)</mark>

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)
1 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:	
if TF.	ed occu A > 13.9 A £ 13.9	9, N = 1		: [1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (1	ΓFA -13.	<u>2</u> .9)	.3]	(42)
Reduce	the annua	l average	hot water	ge in litre usage by r day (all w	5% if the a	lwelling is	designed t			se target o		.73		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate				ach month	,			-					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		
	!										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		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)
	storage			1									1	
-		. ,		ng any se			-		ame ves	sel	(0		(47)
	•	-		ank in dw	-			. ,	oro) onto	or (0) in (47)			
	storage		not wate	er (this ir	iciuues i	nstantai	ieous co		ers) erne		47)			
	-		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)
				cylinder										(= .)
		•	ee secti	rom Tabl on 4.3	e z (kvv	n/litre/da	iy)				0.	02		(51)
	e factor i	•									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)
				for each		,	. ,	• •						
· .	· · ·		1	le H5 if t	1	1	1	-	· ·		· · ·		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	cylii	nder i	s in the c	dwell	ing	or hot w	ater is	from com	nmun	nity h	eating	
		ains (see				-	-				Ū						.	
		ns (Table			·													
metab	Jan	Feb	Mar		Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov		Dec		
(66)m=	114.81	114.81	114.81	+	114.81	114.81	+	14.81	114.81	114	-	114.81	114.8			4.81		(66)
	n dains	i (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	<u> </u>	10.08	7.54	-	6.36	6.87	8.9		11.99	15.23	17.77	18	.95		(67)
		ains (calc		_														
(68)m=	202.16	<u> </u>	198.97	-	187.71	173.51	T	60.16	151.24	149		154.43	165.68	3 179.89	103	3.24		(68)
				_			_							179.09	130	5.24		(00)
	34.48	s (calcula 34.48	34.48	<u> </u>	34.48	L, equa	-	1 L15 34.48	or L15a) 34.48			34.48		24.49		40	I	(69)
(69)m=						34.40		94.40	34.40	34.	40	34.46	34.48	34.48	34	.48		(09)
-		ins gains	r i i i i i i i i i i i i i i i i i i i	58			1								1	•	I	(70)
(70)m=	0	0	0		0	0		0	0	0)	0	0	0		0		(70)
		vaporatic		_			-	-		-					-		I	<i>(</i> - <i>i</i>)
	-91.84			_	-91.84	-91.84	-9	91.84	-91.84	-91	.84	-91.84	-91.84	-91.84	-91	.84		(71)
	`	gains (T		<u> </u>			-										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		l gains =							. ,	1 + (68 -	3)m -	· · /	(70)m +	(71)m + (72	·			
(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)
	lar gain																	
				lar			and			tions	to co		e applic	able orienta	ation.			
Orienta		Access F Table 6d			Area m²			Flu Tal	x ble 6a		т	g_ able 6b		FF Table 6c			Gains (W)	
N 1 (1										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	x		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.

Result	s and in	iputs into	ormea by	y aevelo	oer aeci	aration.	Any aev	latior	i is certai	n to o	utpu	t amereni	resu	Its.		
North	0.9x	0.77	x	6.5	58	x	79.99	×	0.35		×	0.8		= [102.16	(74)
North	0.9x	0.77	x	6.5	58	x	74.68	- x	0.35		×	0.8		=	95.37	(74)
North	0.9x	0.77	x	6.5	58	x	59.25	x	0.35		×	0.8		= [75.67	(74)
North	0.9x	0.77	x	6.5	58	x	41.52	x	0.35		×	0.8		= [53.02	(74)
North	0.9x	0.77	x	6.5	58	x	24.19	x	0.35		×	0.8		= [30.89	(74)
North	0.9x	0.77	x	6.5	58	x	13.12	x	0.35		×	0.8		= [16.75	(74)
North	0.9x	0.77	x	6.5	58	x	8.86	x	0.35		×	0.8		= [11.32	(74)
East	0.9x	0.77	x	6.2	28	x	19.64	x	0.35		x	0.8		= [23.91	(76)
East	0.9x	0.77	x	6.2	28	x	38.42	x	0.35		x	0.8		= [46.78	(76)
East	0.9x	0.77	x	6.2	28	x	63.27	x	0.35		×	0.8		= [77.04	(76)
East	0.9x	0.77	x	6.2	28	x	92.28	x	0.35		x	0.8		= [112.36	(76)
East	0.9x	0.77	x	6.2	28	x	113.09	x	0.35		x	0.8		= [137.7	(76)
East	0.9x	0.77	x	6.2	28	x ·	115.77	x	0.35		×	0.8		= [140.96	(76)
East	0.9x	0.77	x	6.2	28	x	110.22	x	0.35		×	0.8		= [134.2	(76)
East	0.9x	0.77	x	6.2	28	x	94.68	x	0.35		×	0.8		= [115.28	(76)
East	0.9x	0.77	x	6.2	28	x	73.59	x	0.35		×	0.8		= [89.6	(76)
East	0.9x	0.77	x	6.2	28	x	45.59	x	0.35		×	0.8		= [55.51	(76)
East	0.9x	0.77	x	6.2	28	x	24.49	x	0.35		×	0.8		= [29.82	(76)
East	0.9x	0.77	x	6.2	28	x	16.15	x	0.35		×	0.8		= [19.67	(76)
1		watts, ca		1		1		r í	n = Sum(74)					_		(22)
(83)m=	37.49	72.73	121.14	183.2	233.13	243.12	229.58	190	.95 142.0	63 8	86.4	46.57	30.9	9		(83)
-		nternal a		550.47	· ,	· · /		E10	74 470	70 4	27.04	400.70	400	-		(84)
(84)m=		472.88	508.69	I	579.89	570.06	543.62	510	.71 472.	78 4.	37.04	420.72	422.	<u>′</u>		(04)
		nal temp				·								r		_
								ble 9	, Th1 (°C)				l	21	(85)
Utilisa		tor for g		<u> </u>			<u> </u>				<u> </u>			_		
(0.0)	Jan	Feb	Mar	Apr	May	Jun	Jul		ug Se	<u> </u>	Oct	Nov	De	;C		(00)
(86)m=	1	0.99	0.98	0.94	0.8	0.58	0.42	0.4	47 0.74	4 (0.96	0.99	1			(86)
Mean		<u> </u>	r	<u> </u>	r È	ollow ste	eps 3 to 7	1	<u>´</u>					_		
(87)m=	20.34	20.43	20.6	20.82	20.96	21	21	2	1 20.9	8 2	20.81	20.54	20.3	2		(87)
Temp	erature	during h	neating p	periods in	n rest of	dwelling	g from Ta	able	9, Th2 (°0	C)						
(88)m=	20.29	20.29	20.3	20.31	20.31	20.32	20.32	20.	32 20.3	2 2	20.31	20.31	20.3	3		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (s	ee Table	9a)								
(89)m=	1	0.99	0.98	0.92	0.75	0.52	0.36	0.	4 0.68	3 0	0.94	0.99	1			(89)
Maan	interne	Itompor	oturo in	the reat	of dwall	ing TO (follow of		to 7 in T							

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

(90)m=	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	iLA = Livin	g area ÷ (4	4) =	0.36	(91)

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

(92)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														
	(92)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	(92)

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

										_	_		
(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. Space hea	ating requ	uirement											
Set Ti to the			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation	Feb	Mar			lup	Jul	Aug	Son	Oct	Nov	Dee		
Jan Utilisation fac			Apr	May	Jun	Jui	Aug	Sep	Oci	Nov	Dec		
(94)m= 1	0.99	0.98	0.92	0.77	0.54	0.38	0.42	0.7	0.94	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	1)m x (84	4)m						I			
(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)
Monthly aver	age exte	rnal tem	perature	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			Lm , W =	=[(39)m	x [(93)m	– (96)m]			I	
(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 heatin	r i						1			<u> </u>		1	
(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/yea	r) = Sum(9	8)15,912 =	1381.66	(98)
Space heatin	ng require	ement in	kWh/m ²	/year								19.16	(99)
9b. Energy rec	quiremen	its – Cor	nmunity	heating	scheme								
This part is us										unity scł	neme.		
Fraction of spa	ace heat	from see	condary/	supplen	nentary I	neating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from cor	mmunity	system	1 – (301	1) =						1	(302)
						,							
The community so	-					procedure			up to four	other heat	sources; ti	he latter]
includes boilers, h	heat pumps	s, geothern	nal and wa	aste heat f		procedure			up to four	other heat	sources; ti		(303a)
includes boilers, h Fraction of hea	heat pumps at from C	s, geothern Communi	nal and wa ity heat	aste heat f oump	rom powel	brocedure r stations.						1	(303a)
includes boilers, h Fraction of hea Fraction of tota	heat pumps at from C al space	s, geothern Communi heat froi	nal and wa ity heat m Comn	aste heat f oump nunity he	rom power	orocedure r stations.	See Appei	ndix C.	(3	other heat 602) x (303		1	(304a)
includes boilers, h Fraction of hea Fraction of tota Factor for cont	heat pumps at from C al space trol and c	s, geotherm Communi heat froi charging	nal and wa ity heat m Comn method	aste heat f oump nunity he (Table 4	rom power eat pump 4c(3)) fo	r commu	See Apper unity hea	ndix C.	(3			1 1 1	(304a) (305)
includes boilers, h Fraction of hea Fraction of tota	heat pumps at from C al space trol and c	s, geotherm Communi heat froi charging	nal and wa ity heat m Comn method	aste heat f oump nunity he (Table 4	rom power eat pump 4c(3)) fo	r commu	See Apper unity hea	ndix C.	(3			1	(304a)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating	heat pumps at from C al space trol and c ss factor g	s, geothern Communi heat fror charging (Table 1	nal and wa ity heat m Comn method 2c) for c	aste heat f oump nunity he (Table 4	rom power eat pump 4c(3)) fo	r commu	See Apper unity hea	ndix C.	(3			1 1 1.05 kWh/yea	(304a) (305) (306)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los	heat pumps at from C al space trol and c ss factor g	s, geothern Communi heat fror charging (Table 1	nal and wa ity heat m Comn method 2c) for c	aste heat f oump nunity he (Table 4	rom power eat pump 4c(3)) fo	r commu	See Apper unity hea	ndix C.	(3			1 1 1 1.05	(304a) (305) (306)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating	heat pumps at from C al space trol and c ss factor g heating i	s, geothern Communi heat fror charging (Table 1 requirem	nal and wa ity heat p m Comn method 2c) for c nent	aste heat f oump nunity he (Table 4 commun	rom power eat pump 4c(3)) fo	r commu	See Apper unity hea	ndix C. hting sys	(3 tem		a) =	1 1 1.05 kWh/yea	(304a) (305) (306)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space	heat pumps at from C al space trol and c ss factor g heating i bom Comr	s, geothern Communi heat fror charging (Table 1 requirem nunity he	nal and wa ity heat m Comn method 2c) for c nent eat pum	aste heat f oump nunity he (Table 4 commun	rom power eat pump 4c(3)) fo ity heatin	r stations. r stations r commu	See Apper unity hea m	ndix C. hting syst	(3 tem 04a) x (30	5) x (303)	a) =	1 1 1.05 kWh/yea 1381.66	(304a) (305) (306) ar
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro	heat pumps at from C al space trol and c ss factor g heating t bom Comr econdary	s, geothern Communi heat fror charging (Table 1 requirem nunity he r/suppler	nal and wa ity heat p m Comm method 2c) for c nent eat pump mentary	aste heat f pump nunity he (Table 4 commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r commund ng syste	See Apper unity hea m om Table	ndix C. hting syst (98) x (30 e 4a or A	(3 tem 04a) x (30	5) x (303) 5) x (306) ; E)	a) =	1 1 1.05 kWh/yea 1381.66 1450.75	(304a) (305) (306) ar (307a)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Efficiency of se Space heating	heat pumps at from C al space trol and c ss factor g heating i bom Comr econdary g requirer	s, geothern Communi heat fror charging (Table 1 requirem nunity he r/suppler	nal and wa ity heat p m Comm method 2c) for c nent eat pump mentary	aste heat f pump nunity he (Table 4 commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r commund ng syste	See Apper unity hea m om Table	ndix C. hting syst (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	5) x (303) 5) x (306) ; E)	a) =	1 1 1.05 kWh/yea 1381.66 1450.75 0	(304a) (305) (306) ar (307a) (308
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Efficiency of se	heat pumps at from C al space trol and c ss factor g heating i bom Comr econdary g requirer g	s, geothern Communi heat froi charging (Table 1 requirem nunity he r/supplei ment fror	mal and wa ity heat p m Comm method 2c) for c nent eat pump mentary m secon	aste heat f pump nunity he (Table 4 commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r commund ng syste	See Apper unity hea m om Table	ndix C. hting syst (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	5) x (303) 5) x (306) ; E)	a) =	1 1 1.05 kWh/yea 1381.66 1450.75 0	(304a) (305) (306) ar (307a) (308
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Efficiency of se Space heating Water heating	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r	s, geothern Communi heat froi charging (Table 1 requirem nunity he //supplei ment froi equirem	mal and wa ity heat p m Comn method 2c) for c nent eat pump mentary m secon ent	aste heat f pump nunity he (Table 4 commun p heating	rom power eat pump 4c(3)) fo ity heatin system	r commund syste	See Apper unity hea m om Table	ndix C. hting syst (98) x (30 e 4a or A	(3 tem 04a) x (30 ppendix	5) x (303) 5) x (306) ; E)	a) =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0	(304a) (305) (306) ar (307a) (308
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Efficiency of so Space heating Water heating Annual water h	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r	s, geothern Communi heat froi charging (Table 1 requirem nunity he nunity he nunity he requirem equirem	mal and wa ity heat p m Comm method 2c) for c nent eat pump mentary m secon ent ne:	aste heat fro pump (Table 4 commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system	r commund syste	See Apper unity hea m om Table	(98) x (30 (98) x (30 (98) x (30 (98) x (30	(3 tem 04a) x (30 ppendix 01) x 100	5) x (303) 5) x (306) ; E)	a) = =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0	(304a) (305) (306) ar (307a) (308
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Efficiency of se Space heating Water heating Annual water h If DHW from c	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r communit	s, geothern Communi heat froi charging (Table 1 requirem nunity he nunity he cy schem nunity he	mal and wa ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump	aste heat fro pump (Table 4 commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system	r commund syste	See Apper unity hea m om Table tem	(98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	5) x (303) 5) x (306) = 5 E) ÷ (308) =	a) = =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0 0 2046.95	(304a) (305) (306) ar (307a) (308 (309)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Space heating Water heating Annual water h If DHW from c Water heat fro	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r communit om Comn d for hea	s, geothern Communi heat froi charging (Table 1 requirem nunity he requirem equirem sy schem nunity he t distribu	mal and wa ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump ution	aste heat fro pump (Table 4 commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system	r commund syste	See Apper unity hea m om Table tem	(98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30	5) x (303) 5) x (306) = 5) x (308) =	a) = =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0 0 2046.95 2149.29	(304a) (305) (306) ar (307a) (308 (309) (309)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Space heating Water heating Annual water h If DHW from c Water heat fro Electricity used	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r communit om Comn d for hea m Energ	s, geothern Communi heat froi charging (Table 1 requirem nunity he requirem equirem sy schem nunity he t distribu y Efficier	mal and wa ity heat p m Comm method 2c) for c nent eat pump mentary m secon ent ne: eat pump ution ncy Ratio	aste heat fro pump (Table 4 commun p heating dary/sup	rom power eat pump 4c(3)) fo ity heatin system oplemen	in % (frc	See Apper unity hea m om Table tem	(98) x (30 (98) x (30 (98) x (30 (64) x (30	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	5) x (303) 5) x (306) = 5) x (308) =	a) = =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0 2046.95 2149.29 36	(304a) (305) (306) ar (307a) (308 (309) (310a) (313)
includes boilers, h Fraction of hea Fraction of tota Factor for cont Distribution los Space heating Annual space Space heat fro Space heating Water heating Annual water h If DHW from c Water heat fro Electricity used Cooling System	heat pumps at from C al space trol and c ss factor g heating r com Comr econdary g requirer g heating r communit om Comn d for hea m Energ i (if there	s, geothern Communi heat froi charging (Table 1 requirem nunity he requirem anunity he sy schem nunity he t distribu y Efficier is a fixe	mal and wa ity heat p m Comm method 2c) for c nent eat pump m secon ent ne: eat pump ution ncy Ratio d cooling	aste heat fro pump (Table 4 commun p heating dary/sup p dary/sup	n, if not e	in % (fro tary syste	See Apper unity hea m om Table tem	ndix C. (98) x (30 e 4a or A (98) x (30 (64) x (30 x [(307a).	(3 tem 04a) x (30 ppendix 01) x 100 03a) x (30 (307e) +	5) x (303) 5) x (306) = 5) x (308) =	a) = =	1 1 1.05 kWh/yea 1381.66 1450.75 0 0 2046.95 2149.29 36 0	(304a) (305) (306) ar (307a) (307a) (308 (309) (310a) (313) (314)

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 Append	dix L)				325.57	(332)
Total delivered energy for all uses (307)	+ (309) + (310)	+ (312) + (315) + (331) + (332	2)(237b) =		4101.57	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fact kg CO2/kWh		nissions J CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)	• •	ot CHP) CHP using two fuels repeat (363) to (366) for the second	d fuel	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 s	ystems	(363)(366) + (368)(372))	=	485.79	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	ion heater or in	stantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			485.79	(376)
CO2 associated with electricity for pump	os and fans with	in dwelling (331)) x	0.52	=	91.32	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52	=	168.97	(379)
Total CO2, kg/year	sum of (376)(38	2) =			746.08	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				10.35	(384)
El rating (section 14)					91.46	(385)

roject Informat	ion:			
ssessed By:	Robyn Berry (ST	RO036659)	Building Type:	Flat
Owelling Details	:			
	G DESIGN STAGE		Total Floor Area: 9	9.23m²
ite Reference :	BP Finchley Roa	ld	Plot Reference:	G05 BP Finchley Rd
ddress :	G05 BP Finchley	v Rd, London, NW3 5EY		
Client Details:				
ame: ddress :				
•		within the SAP calculations. ations compliance.		
a TER and DE		•		
uel for main hea	ating system: Electri	city (c)		
uel factor: 1.55				
-	ioxide Emission Rate	. ,	26.52 kg/m ²	
-	Dioxide Emission R	ate (DER)	9.43 kg/m ²	OK
1b TFEE and D			FC 0 LVM/ b /m 2	
-	ergy Efficiency (TFE		56.8 kWh/m ²	
weiling Fabric E	Energy Efficiency (D	FEE)	40.0 kWh/m ²	ОК
2 Fabric U-valu	les			OK
Elemen	t	Average	Highest	
External	wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wa	all	0.00 (max. 0.20)	-	OK
Floor		0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof		(no roof)		
Opening	js	0.93 (max. 2.00)	1.20 (max. 3.30)	OK
2a Thermal brid	dging			
Thermal Air permeabil		from linear thermal transmittan	ces for each junction	
	ability at 50 pascals		3.00 (design val	le)
Maximum			10.0	OK
4 Heating effici	ency			
Main Heat	ing system:	Community heating scheme	es - Heat pump	
Secondary	v heating system:	None		
5 Cylinder insu	lation			
Hot water		No cylinder		
6 Controls		,		

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	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 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

DER WorkSheet: New dwelling design stage

Assessor Name:Robyn BerryStroma Number:STR0036659Software Name:Stroma FSAP 2012Software Version:Version: 1.0.5.16Property Address: 205 BP Finchley RdAddress :205 BP Finchley Rd, London, NW3 5EY1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor62.73(1a) x2.54(2a) =159.34(3a)
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)
Address : 205 BP Finchley Rd, London, NW3 5EY 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³)
1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³)
Area(m ²) Av. Height(m) Volume(m ³)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 62.73 (4)
Dwelling volume $(3a)+(3c)+(3d)+(3e)+(3n) = 159.34$ (5)
2. Ventilation rate:
main secondary other total m³ per hour 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 $0 \times 10 = 0$ (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)
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
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 stripped0Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0(15)
(0) + (10) + (11) + (12) + (12) + (15) = (12)
Air permeability value, q50, 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) Lefther increases in sector in the factor $(21) - (12) \times (22)$ (21) (22)
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 3.7 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

Adjusted infiltration rate (allowing for shelter and wind speed) = $(21a) \times (22a)m$	
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 air change rate for the applicable case	(02-)
If mechanical ventilation: If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)	0.5 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.5 (23b)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × $[1 - (23c)]$	76.5 (23c)
(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	÷ 100j (24a)
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)
c) If whole house extract ventilation or positive input ventilation from outside	
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)	
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	(244)
(24d)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	(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 and heat loss parameter:	
ELEMENTGross area (m²)Openings m²Net Area A ,m²U-value W/m2KA X U (W/K)k-value kJ/m²·k	
Doors 2.1 × 1.2 = 2.52	(26)
Windows Type 1 7.613 $x^{1/[1/(0.9)+0.04]} = 6.61$	(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 2.1 19.38 x 0.14 = 2.74	(29)
Total area of elements, m ² 56.06	(31)
Party wall $37.5 \times 0 = 0$	(32)
Party floor 62.73	(32a)
Party ceiling 62.73	(32b)
* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph	
** 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/m ² K Indicative Value: Medium	250 (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 $(36) = 0.05 \times (31)$ Total fabric heat loss $(33) + (36) =$	
Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$	22.74 (37)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(38)m= 13.97 13.82 13.67 12.9 12.75 11.99 11.83 12.29 12.75 13.06 13.36	(38)
Heat transfer coefficient, W/K $(39)m = (37) + (38)m$. ,
(39)m = 36.72 36.56 36.41 35.65 35.49 34.73 34.73 34.58 35.03 35.49 35.8 36.1	
Stroma FSAP 2012 Version: 1.0.5.16 (SAP 9.92) - http://www.stroma.com Average = Sum(39) ₁₁₂ /12=	35.6¢age 2 ∳(3€)

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	er of dav	s in mo	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)
I	I			1									1	
4. Wa	ter heat	ing enei	rgy requ	irement:								kWh/ye	ear:	
if TF.	ed occu A > 13.9 A £ 13.9	9, N = 1		: [1 - exp	(-0.0003	849 x (TF	-A -13.9)2)] + 0.(0013 x (1	ΓFA -13.		06]	(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 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				ach month	`				Seb	001	INOV	Dec		
(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		
· · /									-	Fotal = Su	m(44) ₁₁₂ =	:	996.85	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D)Tm / 3600) kWh/mon	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 instant	anoous w	ator hoati	na at point	t of uso (no	hot wato	storage)	ontor 0 in	hovos (16		Fotal = Su	m(45) ₁₁₂ =		1307.03	(45)
	i		- ·	· ·				boxes (46)					1	(40)
(46)m= Water	^{20.33} storage	17.78 loss:	18.35	15.99	15.35	13.24	12.27	14.08	14.25	16.61	18.13	19.69		(46)
	-		includir	ng any so	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)					1	
Otherw	ise if no	stored	hot wate	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
	storage			<i>.</i>		(1.)	(1)						1	
,				oss facto	or is kno	wn (kvvr	n/day):					0		(48)
			m Table					· · · · · · · · · · · · · · · · · · ·				0		(49)
•••			-	e, kWh/ye cylinder l		or is not		(48) x (49)) =		1'	10		(50)
				rom Tabl							0.	02		(51)
If comr	nunity h	eating s	ee secti	on 4.3										
	e factor										1.	03		(52)
			m Table								0	.6		(53)
•••			-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
	(50) or (, ,		(((50))			1.	03		(55)
	-		r	for each				((56)m = (n			1	
(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	orage, (57)i	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	IIX 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)
		•	,	om Table								0		(58)
								65 × (41)						
· · ·			1		1		-	ng and a	-		-	00.00	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	ch r	nonth (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	hea	ating ca	alculate	d fo	r eac	h month	(62)	m =	0.85 × ((45)m	+ (46	6)m +	(57)r	n +	(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 1	74.34	186.	51		(62)
Solar DH	HW input	calculated	using Ap	oper	ndix G or	Appendi	хH	(negati	ve quantity	/) (ent	er '0'	if no sola	r contrib	oution	to wate	er heat	ing)		
(add a	dditiona	al lines if	FGHR	S a	nd/or V	VWHR	S ap	oplies	, 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=	190.79	168.45	177.58	3	160.12	157.59	1.	41.78	137.09	149	.15	148.49	165.9	9 1	74.34	186.	51		_
											Outp	out from wa	ater hea	ater (a	nnual)₁	12		1957.87	(64)
Heat g	ains fro	om water	heating	g, k	(Wh/mo	onth 0.2	5 ´	[0.85	x (45)m	+ (6	1)m) + 0.8 ×	([(46)	m + ((57)m	+ (59	9)m]	
(65)m=	89.28	79.35	84.89		78.25	78.24	7	2.15	71.42	75.	44	74.38	81.03	3 8	32.98	87.8	36		(65)
inclu	de (57)m in calo	culatior	n of	ⁱ (65)m	only if a	cylir	nder i	s in the c	dwell	ing	or hot w	ater is	fron	n com	muni	ty h	eating	
5. Int	ernal g	ains (see	Table	5 a	and 5a)):													
Metabo	olic gai	ns (Table	e 5), Wa	atts	6														
	Jan	Feb	Mar		Apr	May		Jun	Jul	Α	ug	Sep	Oct	t	Nov	De	эс		
(66)m=	102.89	102.89	102.89	,	102.89	102.89	1	02.89	102.89	102	.89	102.89	102.8	9 1	02.89	102.	89		(66)
Lightin	g gains	(calcula	ted in A	٩pp	pendix l	_, equa	tion	L9 o	r L9a), a	lso s	ee 7	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	4 1	6.38	17.4	46		(67)
Appliar	nces ga	ains (calc	ulated	in /	Append	lix L, ec	uat	tion L	13 or L1	3a), i	also	see Ta	ble 5						
(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 1	59.97	171.	85		(68)
Cookin	ig gain	s (calcula	ted in <i>i</i>	 App	pendix	L, equa	tior	า L15	or L15a)	, als	o se	e Table	5						
(69)m=	33.29	33.29	33.29	<u> </u>	33.29	33.29	-	33.29	33.29	33.		33.29	33.29	9 3	33.29	33.2	29		(69)
Pumps	and fa	ins gains	(Table	9 5a	a)		-												
(70)m=	0	0	0	Τ	0	0		0	0	0		0	0		0	0			(70)
Losses	se.q.e	vaporatio	n (neg	ativ	ve valu	es) (Tal	ble	5)						_					
(71)m=					-82.31	, ,	-	, 82.31	-82.31	-82	.31	-82.31	-82.3	1 -	82.31	-82.	31		(71)
Water	heating	gains (T	able 5)			1												
(72)m=	120	118.08	114.09	<u>_</u>	108.68	105.16	1	00.21	96	101	.39	103.31	108.9	2 1	15.25	118.	09		(72)
Total i	nterna	l gains =	L				1	(66)	m + (67)m	ı + (68	3)m +	- (69)m + (I (70)m +	(71)m	า + (72)	m			
(73)m=	370.64	- <u>-</u>	357.18	3	338.77	320.28	3	02.37	290.7	296	.13	305.56	324.1	6 3	45.47	361.	27		(73)
6. Sol	lar gain	IS:		-			-						1	_					
		calculated	using so	lar f	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e applic	cable o	orientat	ion.			
Orienta		Access F	actor		Area			Flu				g_			FF			Gains	
		Table 6d			m²			Tal	ble 6a		Т	able 6b		Tabl	le 6c			(W)	
North	0.9x	0.77		× [7.6	1	x	1	0.63	x		0.35	x		0.8		=	15.71	(74)
North	0.9x	0.77		× [7.6	1	x	2	20.32	x		0.35	×		0.8		=	30.02	(74)
North	0.9x	0.77		× [7.6	1	x	3	34.53	x		0.35	×		0.8		=	51.01	(74)
North	0.9x	0.77		×[7.6	1	x	5	5.46	x		0.35	×		0.8		=	81.93	(74)
North	0.9x	0.77		× [7.6	1	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	7.0	61	x	7	9.99	x		0.35	x	0.8		=	118.16	(74)
North	0.9x	0.77	x	7.0	61	x	7	4.68	×		0.35	×	0.8		=	110.31	(74)
North	0.9x	0.77	x	7.0	61	x	5	9.25	×		0.35	×	0.8		=	87.52	(74)
North	0.9x	0.77	x	7.0	61	x	4	1.52	×		0.35	×	0.8		=	61.33	(74)
North	0.9x	0.77	x	7.0	61	x	2	4.19	×		0.35	×	0.8		=	35.73	(74)
North	0.9x	0.77	x	7.0	61	x	1	3.12	×		0.35	×	0.8		=	19.38	(74)
North	0.9x	0.77	x	7.0	61	x	5	3.86	×		0.35	×	0.8		=	13.09	(74)
Northwes	st 0.9x	0.77	x	1.0	67	x	1	1.28	×		0.35	×	0.8		=	3.65	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	2	2.97	×		0.35	×	0.8		=	7.43	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	4	1.38	×		0.35	×	0.8		=	13.38	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	6	7.96	×		0.35	×	0.8		=	21.98	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	9	1.35	x		0.35	×	0.8		=	29.55	(81)
Northwes	st 0.9x	0.77	x	1.0	67	×	9	7.38	×		0.35	×	0.8		=	31.5	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x		91.1	×		0.35	×	0.8		=	29.47	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	7	2.63	x		0.35	×	0.8		=	23.49	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	5	0.42	×		0.35	×	0.8		=	16.31	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x	2	8.07	×		0.35	×	0.8		=	9.08	(81)
Northwes	st 0.9x	0.77	x	1.0	67	x		14.2	×		0.35	×	0.8		=	4.59	(81)
Northwes	st 0.9x	0.77	x	1.0	67	×	ļ	9.21	×		0.35	×	0.8		=	2.98	(81)
	_					•			•								
Solar ga	ins in [.]	watts. ca	alculated	d for eac	h montl	า			(83)m	ı = Su	m(74)m .	(82)m					
Ŭ,	19.36	37.45	64.39	103.91	139.92	-	49.66	139.78	111	.01	77.64	44.8	23.97	16.0	08		(83)
Total gai	ins – ir	nternal a	nd sola	I r (84)m :	I = (73)m	+ (8	33)m	, watts					1	_I			
(84)m=	390	406.13	421.57	442.69	460.19	45	52.02	430.48	407	.14	383.2	368.9	7 369.44	377.	.34		(84)
7 Mear	n inter	nal temp	erature	(heating	1 seaso	n)											
						<i>´</i>	area	rom Tak	ole 9	. Th1	(°C)					21	(85)
	Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) 21 (85)																
		<u> </u>		<u> </u>	1 .	_`		,			0.00	0					
L L	Jan	Feb	Mar	Apr	May	_	Jun	Jul		ug	Sep	Oc	_	-	ес		(86)
(96)m -	0 00		0.07	1 0 00	0.71	1 1	n 40	0.25			0.60	0.0					(86)

													1	
Total g	ains – ii	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		(84)
7 Me	an inter	nal temp	erature	(heating	season)								
		during h					from Tak		1 (°C)				21	(85)
		•	• •			-		ле <u>э</u> , тп	1(0)				21	
Utilisa	ation fac	tor for g	ains for	living are	ea, h1,m	(see La	ble 9a)				· · · · ·		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(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		(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	neating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	n2 (°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	ation fac	tor for g	ains for	rest of d	welling, I	h2,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 (fe	ollow ste	eps 3 to 7	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		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.35	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) x T2					
			· · · ·		-	<u> </u>		` <u> </u>	,		·			

						0,							
(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. Space hea	ating requ	irement													
Set Ti to the			•		ed at ste	ep 11 of	Table 9k	o, so tha	t Ti,m=(76)m an	d re-calc	ulate			
the utilisation	Feb	Mar	Apr	May	Jun	Jul	Δυσ	Sep	Oct	Nov	Dec				
Utilisation fac			•	iviay	Jun	Jui	Aug	Jep	001	INUV	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)		
Useful gains,	hmGm,	W = (94	1)m x (84	L 4)m											
(95)m= 386.33		405.34	385.81	, 314.01	210.19	140.82	147.16	228.7	325.65	360.46	374.48		(95)		
Monthly aver	age exter	rnal tem	perature	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 rat	e for mea	in intern			Lm , W =	=[(39)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)		
Space heatir	<u> </u>				1	1				· · · · · · · · · · · · · · · · · · ·					
(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/year) = Sum(9	8)15,912 =	609.06	(98)		
Space heatir	ng require	ment in	kWh/m ²	/year								9.71	(99)		
9b. Energy ree	quiremen	ts – Cor	nmunity	heating	scheme)									
This part is us										unity sch	ieme.		_		
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none												0	(301)		
Fraction of spa	ace heat	from cor	mmunity	' system	1 – (30′	1) =						1	(302)		
The community s	-								ip to four o	other heat	sources; tl	ne latter			
includes boilers, l Eraction of be		-			rom powei	r stations.	See Apper	ndix C.			ſ	4			
						Fraction of heat from Community heat pump									
Fraction of tot	al space l	heat fror	Fraction of total space heat from Community heat pump (302) x (303a) =										(303a)		
Factor for con	trol and c	Factor for control and charging method (Table 4c(3)) for community heating system										1	(303a) (304a)		
Distribution loss factor (Table 12c) for community heating system										02) x (303	a) =		4		
Distribution los	ss factor	0 0		(Table	4c(3)) fo	r commu		iting sys		02) x (303	a) =	1	(304a)		
		0 0		(Table	4c(3)) fo	r commu		iting sys		02) x (303	a) = [1	(304a) (305) (306)		
Distribution los Space heatin Annual space	g	(Table 1	2c) for c	(Table	4c(3)) fo	r commu		ting sys		02) x (303	a) = [1 1 1.05	(304a) (305) (306)		
Space heatin	g heating r	(Table 1	2c) for a	(Table -	4c(3)) fo	r commu			tem	02) x (303; 5) x (306) =	[1 1 1.05 kWh/yea	(304a) (305) (306)		
Space heatin Annual space Space heat fro	g heating r om Comn	(Table 1 requirem	2c) for c nent eat pum	(Table commun	4c(3)) fo ity heatii	r commu ng syste	m	(98) x (30	tem 04a) x (305	5) x (306) =	[1 1.05 kWh/yea 609.06 639.51	(304a) (305) (306) r (307a)		
Space heatin Annual space Space heat fro Efficiency of s	g heating r om Comn econdary	(Table 1 requirem nunity he	2c) for c nent eat pum mentary	(Table commun commun p heating	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table	(98) x (30 e 4a or A	tem 04a) x (309 ppendix	5) x (306) = E)	[1 1.05 kWh/yea 609.06 639.51 0	(304a) (305) (306) r (307a) (308		
Space heatin Annual space Space heat fro	g heating r om Comn econdary	(Table 1 requirem nunity he	2c) for c nent eat pum mentary	(Table commun commun p heating	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table	(98) x (30 e 4a or A	tem 04a) x (305	5) x (306) = E)	[1 1.05 kWh/yea 609.06 639.51	(304a) (305) (306) r (307a)		
Space heatin Annual space Space heat fro Efficiency of s	g heating r om Comn econdary g requiren g	(Table 1 requirem nunity he r/suppler nent fror	2c) for c nent eat pum mentary m secon	(Table commun commun p heating	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table	(98) x (30 e 4a or A	tem 04a) x (309 ppendix	5) x (306) = E)	[1 1.05 kWh/yea 609.06 639.51 0	(304a) (305) (306) r (307a) (308		
Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating	g heating r om Comm econdary g requiren g heating re community	(Table 1 requirem nunity he r/suppler nent fror equireme y schem	2c) for c nent eat pum mentary m secon ent ne:	(Table - commun p heating dary/su	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table	(98) x (30 e 4a or A (98) x (30	tem 04a) x (309 ppendix 01) x 100 -	5) x (306) = E)	= [[[[1 1.05 kWh/yea 609.06 639.51 0 0	(304a) (305) (306) r (307a) (308		
Space heatin Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from of Water heat fro	g heating r om Comm econdary g requiren g heating re community om Comm	(Table 1 requirem nunity he /suppler nent fror equireme y schem nunity he	2c) for c nent eat pum mentary m secon ent ne: eat pump	(Table - commun p heating dary/su	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table tem	(98) x (30 e 4a or A (98) x (30 (64) x (30	tem 04a) x (309 ppendix 01) x 100 -	5) x (306) = E) - (308) =	= [1 1.05 kWh/yea 609.06 639.51 0 0 1957.87	(304a) (305) (306) r (307a) (308 (309) (309)		
Space heating Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from of Water heat fro Electricity use	g heating r om Comm econdary g requiren g heating re community om Comm d for heat	(Table 1 requirem nunity he /suppler nent fror equireme y schem nunity he t distribu	2c) for c nent eat pum mentary m secon ent ne: eat pump ution	(Table) commun p heating dary/sup	4c(3)) fo ity heatii system	r commu ng syste in % (frc	m om Table tem	(98) x (30 e 4a or A (98) x (30 (64) x (30	tem 04a) x (309 ppendix 01) x 100 -	5) x (306) = E) - (308) = 5) x (306) =	= [1 1.05 kWh/yea 609.06 639.51 0 0 1957.87 2055.77 26.95	(304a) (305) (306) r (307a) (307a) (308 (309) (309) (310a) (313)		
Space heating Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from of Water heat fro Electricity use Cooling Syste	g heating r om Comm econdary g requiren g heating re community om Comm d for heat m Energy	(Table 1 requirem nunity he r/suppler nent fror equirem y schem nunity he t distribu y Efficier	2c) for c nent eat pum mentary m secon ent ne: eat pump ution ncy Ratio	(Table) commun p heating dary/sup	system	r commu ng syste in % (fro tary syst	m om Table tem	(98) × (30 • 4a or A (98) × (30 (64) × (30 × [(307a).	tem 04a) x (309 ppendix 01) x 100 - 03a) x (309 (307e) +	5) x (306) = E) - (308) = 5) x (306) =	= [1 1.05 kWh/yea 609.06 639.51 0 0 1957.87 2055.77 26.95 0	(304a) (305) (306) r (307a) (307a) (308 (309) (309) (309) (310a) (313) (314)		
Space heating Annual space Space heat fro Efficiency of s Space heating Water heating Annual water If DHW from of Water heat fro Electricity use	g heating r om Comm econdary g requiren g heating re community om Comm d for heat m Energy g (if there	(Table 1 requirem nunity he r/suppler nent fror equirem y schem nunity he t distribu y Efficier is a fixed	2c) for c nent eat pum mentary m secon ent ne: eat pump ution ncy Ratio d cooling	(Table) commun p heating dary/sup o o g system	4c(3)) fo ity heatin system oplemen	r commu ng syste in % (fro tary syst	m om Table tem	(98) x (30 e 4a or A (98) x (30 (64) x (30	tem 04a) x (309 ppendix 01) x 100 - 03a) x (309 (307e) +	5) x (306) = E) - (308) = 5) x (306) =	= [1 1.05 kWh/yea 609.06 639.51 0 0 1957.87 2055.77 26.95	(304a) (305) (306) r (307a) (307a) (308 (309) (309) (310a) (313)		

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) =		153.09	(331)
Energy for lighting (calculated in Appendix L)				300.09	(332)
Total delivered energy for all uses (307) + (309) -	+ (310) + (312) + (315) + (331) + (332	2)(237b) =		3148.45	(338)
12b. CO2 Emissions – Community heating scher	ne				
	· 57	Emission fact kg CO2/kWh		nissions g CO2/year	
CO2 from other sources of space and water heat Efficiency of heat source 1 (%)	ing (not CHP) there is CHP using two fuels repeat (363) to (3	366) for the second	d fuel	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	(363)(366) + (368)(372)		=	363.7	(373)
CO2 associated with space heating (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater	er or instantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and water heat	ing (373) + (374) + (375) =			363.7	(376)
CO2 associated with electricity for pumps and fail	ns within dwelling (331)) x	0.52	=	79.45	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	155.75	(379)
Total CO2, kg/year sum of (37	76)(382) =			598.9	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			9.55	(384)
El rating (section 14)				92.55	(385)