DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

Property Address: G05 BP Finchley Rd

Address : G05 BP Finchley Rd, London, NW3 5EY

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	99.23	(1a) x	2.54	(2a) =	252.04	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	99.23	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	252.04	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.12	(21)

Infiltration rate modified for monthly wind speed

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation:	0.5	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)	0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	76.5	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			14.758	x1/[1/(0.9)+ 0.04]		=	12.82			(27)
Windows Type 2			1.667	x1/[1/(0.9)+ 0.04]		=	1.45			(27)
Floor			99.228	x	0.1	=	9.9228			(28)
Walls Type1	46.24	16.43	29.81	x	0.15	=	4.47			(29)
Walls Type2	61	2.1	58.9	x	0.14	=	8.33			(29)
Total area of elements, m²			206.46							(31)
Party wall			22.69	x	0	=	0			(32)
Party ceiling			99.23							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U)	(26)…(30) + (32) =	39.52	(33)
Heat capacity Cm = S(A x k)	((28)…(30) + (32) + (32a)…(32e) =	16762.62	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	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		6.56	(36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss	(33) + (36) =	46.07	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	22.1	21.86	21.62	20.41	20.17	18.96	18.96	18.72	19.44	20.17	20.65	21.13	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	68.17	67.93	67.69	66.48	66.24	65.03	65.03	64.79	65.52	66.24	66.72	67.21	

Average = Sum(39)$_{1…12}$ /12= 66.42 (39)

DER WorkSheet: New dwelling design stage

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Heat loss parameter (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

Average = Sum(40)1…12 /12= 0.67 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 2.73 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 99.09 (43)

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 usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	109	105.04	101.07	97.11	93.15	89.18	89.18	93.15	97.11	101.07	105.04	109

Total = Sum(44)1…12 = 1189.1 (44)

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=	161.64	141.38	145.89	127.19	122.04	105.31	97.59	111.98	113.32	132.06	144.16	156.54

Total = Sum(45)1…12 = 1559.09 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(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 loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each 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	158.8	152.86	167.26	166.81	187.34	197.65	211.82	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	216.92	191.3	201.16	180.68	177.32	158.8	152.86	167.26	166.81	187.34	197.65	211.82	

Output from water heater (annual)$_{1...12}$ 2209.93 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	97.97	86.95	92.73	85.08	84.8	77.81	76.67	81.46	80.47	88.13	90.73	96.27	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m=	23.57	20.93	17.02	12.89	9.63	8.13	8.79	11.42	15.33	19.47	22.72	24.22	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m=	255.07	257.72	251.05	236.85	218.93	202.08	190.83	188.18	194.85	209.05	226.97	243.82	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m=	36.66	36.66	36.66	36.66	36.66	36.66	36.66	36.66	36.66	36.66	36.66	36.66	(69)
Pumps and fans gains (Table 5a)													
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m=	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	-109.29	(71)
Water heating gains (Table 5)													
(72)m=	131.68	129.39	124.64	118.17	113.98	108.07	103.05	109.48	111.77	118.46	126.01	129.4	(72)
Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m													
(73)m=	474.3	472.03	456.69	431.9	406.52	382.27	366.65	373.07	385.93	410.96	439.69	461.43	(73)

6. Solar gains:

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	14.76	x	10.63	x	0.35	x	0.8	=	30.45	(74)
North	0.9x	0.77	x	14.76	x	20.32	x	0.35	x	0.8	=	58.19	(74)
North	0.9x	0.77	x	14.76	x	34.53	x	0.35	x	0.8	=	98.88	(74)
North	0.9x	0.77	x	14.76	x	55.46	x	0.35	x	0.8	=	158.83	(74)
North	0.9x	0.77	x	14.76	x	74.72	x	0.35	x	0.8	=	213.96	(74)

DER WorkSheet: New dwelling design stage

North	0.9x	0.77	x	14.76	x	79.99	x	0.35	x	0.8	=	229.05	(74)
North	0.9x	0.77	x	14.76	x	74.68	x	0.35	x	0.8	=	213.85	(74)
North	0.9x	0.77	x	14.76	x	59.25	x	0.35	x	0.8	=	169.66	(74)
North	0.9x	0.77	x	14.76	x	41.52	x	0.35	x	0.8	=	118.89	(74)
North	0.9x	0.77	x	14.76	x	24.19	x	0.35	x	0.8	=	69.27	(74)
North	0.9x	0.77	x	14.76	x	13.12	x	0.35	x	0.8	=	37.56	(74)
North	0.9x	0.77	x	14.76	x	8.86	x	0.35	x	0.8	=	25.38	(74)
Northwest	0.9x	0.77	x	1.67	x	11.28	x	0.35	x	0.8	=	3.65	(81)
Northwest	0.9x	0.77	x	1.67	x	22.97	x	0.35	x	0.8	=	7.43	(81)
Northwest	0.9x	0.77	x	1.67	x	41.38	x	0.35	x	0.8	=	13.38	(81)
Northwest	0.9x	0.77	x	1.67	x	67.96	x	0.35	x	0.8	=	21.98	(81)
Northwest	0.9x	0.77	x	1.67	x	91.35	x	0.35	x	0.8	=	29.55	(81)
Northwest	0.9x	0.77	x	1.67	x	97.38	x	0.35	x	0.8	=	31.5	(81)
Northwest	0.9x	0.77	x	1.67	x	91.1	x	0.35	x	0.8	=	29.47	(81)
Northwest	0.9x	0.77	x	1.67	x	72.63	x	0.35	x	0.8	=	23.49	(81)
Northwest	0.9x	0.77	x	1.67	x	50.42	x	0.35	x	0.8	=	16.31	(81)
Northwest	0.9x	0.77	x	1.67	x	28.07	x	0.35	x	0.8	=	9.08	(81)
Northwest	0.9x	0.77	x	1.67	x	14.2	x	0.35	x	0.8	=	4.59	(81)
Northwest	0.9x	0.77	x	1.67	x	9.21	x	0.35	x	0.8	=	2.98	(81)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	34.1	65.62	112.27	180.81	243.51	260.55	243.31	193.15	135.2	78.35	42.16	28.37	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	508.4	537.65	568.96	612.71	650.03	642.82	609.96	566.22	521.13	489.31	481.85	489.79	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	1	1	0.99	0.97	0.86	0.64	0.47	0.52	0.82	0.98	1	1	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.35	20.42	20.57	20.78	20.94	21	21	21	20.97	20.78	20.54	20.34	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°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)

Utilisation factor for gains for rest of dwelling, h2,m (see 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 internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 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)

fLA = Living area ÷ (4) = 0.41 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × 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

DER WorkSheet: New dwelling design stage

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(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 heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	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)m x (84)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 average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	1058.35	1020.45	921.12	763.15	587.51	392.07	262.24	274.29	426.22	648.02	865.44	1049.43	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	409.83	325.63	265.86	126.15	31.68	0	0	0	0	128.53	277.72	416.87	

	Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	1982.27	(98)
Space heating requirement in kWh/m²/year		19.98	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		1982.27	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	2081.38	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		2209.93	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2320.43	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	44.02	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		242.15	(330a)

DER WorkSheet: New dwelling design stage

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

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	242.15	(331)
Energy for lighting (calculated in Appendix L)		416.24	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		5060.2	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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 systems	(363)…(366) + (368)...(372)			=	593.98	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x		0.52	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =				593.98	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	125.67	(378)
CO2 associated with electricity for lighting	(332))) x		0.52	=	216.03	(379)
Total CO2, kg/year	sum of (376)…(382) =				935.68	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				9.43	(384)
EI rating (section 14)					91.31	(385)

Regulations Compliance Report

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

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 03 August 2022 at 12:36:49

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 72.1m²

Site Reference : BP Finchley Road **Plot Reference:** 405 BP Finchley Rd

Address : 405 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	27.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.35 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.2 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.6 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	**OK**
Openings	0.94 (max. 2.00)	1.20 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North	6.58m²
Windows facing: East	6.28m²
Ventilation rate:	2.00
Blinds/curtains:	None

10 Key features

Thermal bridging	0.037 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
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.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 03 August 2022 at 12:36:51

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.6m²

Site Reference : BP Finchley Road **Plot Reference:** 103 BP Finchley Rd

Address : 103 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	24.96 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.93 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	34.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	28.5 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
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 blind Closed 100% of daylight hours	

10 Key features

Air permeablility	3.0 m^3/m^2h
Windows U-value	0.9 W/m^2K
Party Walls U-value	0 W/m^2K
Community heating, heat from electric heat pump	

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

Property Address: 306 BP Finchley Rd

Address : 306 BP Finchley Rd, London, NW3 5EY

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		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)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	227.83	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

DER WorkSheet: New dwelling design stage

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

Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			10.437	x1/[1/(0.9)+ 0.04]		=	9.07			(27)
Windows Type 2			1.532	x1/[1/(0.9)+ 0.04]		=	1.33			(27)
Walls Type1	51.12	11.97	39.15	x	0.15	=	5.87			(29)
Walls Type2	24.45	2.1	22.36	x	0.14	=	3.16			(29)
Roof	35.51	0	35.51	x	0.12	=	4.26			(30)
Total area of elements, m²			111.09							(31)
Party wall			36.91	x	0	=	0			(32)
Party floor			89.7							(32a)
Party ceiling			54.18							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*
*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 26.22 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 10884.21 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 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 5.65 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 31.86 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

DER WorkSheet: New dwelling design stage

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

(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 coefficient, 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	

Average = Sum(39)$_{1…12}$ /12= 50.26 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(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	

Average = Sum(40)$_{1…12}$ /12= 0.56 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 2.62 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 96.46 (43)

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(44)m=	106.11	102.25	98.39	94.53	90.67	86.82	86.82	90.67	94.53	98.39	102.25	106.11

Total = Sum(44)$_{1…12}$ = 1157.54 (44)

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=	157.35	137.62	142.01	123.81	118.8	102.52	95	109.01	110.31	128.56	140.33	152.39

Total = Sum(45)$_{1…12}$ = 1517.71 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	23.6	20.64	21.3	18.57	17.82	15.38	14.25	16.35	16.55	19.28	21.05	22.86	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter ‘0’ in (47)

Water storage loss:

a) If manufacturer’s declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer’s declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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)

DER WorkSheet: New dwelling design stage

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

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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 calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (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 DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(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

Output from water heater (annual)$_{1...12}$ | 2168.55 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	96.54	85.7	91.44	83.96	83.72	76.88	75.81	80.47	79.47	86.97	89.45	94.89	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	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)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(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)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	238.52	240.99	234.76	221.48	204.72	188.96	178.44	175.96	182.2	195.48	212.24	227.99	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	36.11	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(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	(71)

Water heating gains (Table 5)

(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	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(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	(73)

6. Solar gains:

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	10.44	x	10.63	x	0.35	x	0.8	=	21.53	(74)
North	0.9x	0.77	x	10.44	x	20.32	x	0.35	x	0.8	=	41.15	(74)

DER WorkSheet: New dwelling design stage

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

North	0.9x	0.77	x	10.44	x	34.53	x	0.35	x	0.8	=	69.93	(74)
North	0.9x	0.77	x	10.44	x	55.46	x	0.35	x	0.8	=	112.33	(74)
North	0.9x	0.77	x	10.44	x	74.72	x	0.35	x	0.8	=	151.31	(74)
North	0.9x	0.77	x	10.44	x	79.99	x	0.35	x	0.8	=	161.99	(74)
North	0.9x	0.77	x	10.44	x	74.68	x	0.35	x	0.8	=	151.23	(74)
North	0.9x	0.77	x	10.44	x	59.25	x	0.35	x	0.8	=	119.99	(74)
North	0.9x	0.77	x	10.44	x	41.52	x	0.35	x	0.8	=	84.08	(74)
North	0.9x	0.77	x	10.44	x	24.19	x	0.35	x	0.8	=	48.99	(74)
North	0.9x	0.77	x	10.44	x	13.12	x	0.35	x	0.8	=	26.57	(74)
North	0.9x	0.77	x	10.44	x	8.86	x	0.35	x	0.8	=	17.95	(74)
East	0.9x	0.77	x	1.53	x	19.64	x	0.35	x	0.8	=	5.84	(76)
East	0.9x	0.77	x	1.53	x	38.42	x	0.35	x	0.8	=	11.42	(76)
East	0.9x	0.77	x	1.53	x	63.27	x	0.35	x	0.8	=	18.81	(76)
East	0.9x	0.77	x	1.53	x	92.28	x	0.35	x	0.8	=	27.43	(76)
East	0.9x	0.77	x	1.53	x	113.09	x	0.35	x	0.8	=	33.62	(76)
East	0.9x	0.77	x	1.53	x	115.77	x	0.35	x	0.8	=	34.42	(76)
East	0.9x	0.77	x	1.53	x	110.22	x	0.35	x	0.8	=	32.76	(76)
East	0.9x	0.77	x	1.53	x	94.68	x	0.35	x	0.8	=	28.14	(76)
East	0.9x	0.77	x	1.53	x	73.59	x	0.35	x	0.8	=	21.88	(76)
East	0.9x	0.77	x	1.53	x	45.59	x	0.35	x	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	1.53	x	16.15	x	0.35	x	0.8	=	4.8	(76)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	27.37	52.58	88.74	139.76	184.93	196.4	184	148.13	105.95	62.54	33.85	22.75	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	481.03	503.9	525.38	552.78	573.93	562.42	535.25	505.75	475.86	456.28	454.88	464.31	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	1	1	0.99	0.94	0.79	0.56	0.4	0.44	0.71	0.95	0.99	1	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.55	20.61	20.73	20.9	20.98	21	21	21	20.99	20.9	20.71	20.54	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.45	20.45	20.45	20.47	20.47	20.48	20.48	20.48	20.47	20.47	20.46	20.46	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	1	0.99	0.98	0.92	0.75	0.51	0.36	0.39	0.66	0.93	0.99	1	(89)

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

(90)m=	19.84	19.94	20.11	20.34	20.45	20.48	20.48	20.48	20.47	20.35	20.08	19.83	(90)

fLA = Living area ÷ (4) = 0.39 (91)

DER WorkSheet: New dwelling design stage

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

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	20.11	20.2	20.35	20.56	20.66	20.68	20.68	20.68	20.67	20.56	20.32	20.11	(92)

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

(93)m=	20.11	20.2	20.35	20.56	20.66	20.68	20.68	20.68	20.67	20.56	20.32	20.11	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	1	0.99	0.98	0.93	0.76	0.53	0.37	0.41	0.68	0.94	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(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)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	819.72	789.69	712.02	586.44	448.67	297.88	199.91	208.84	324.94	499.03	668.03	810.64	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	253.21	194.18	145.67	53.32	8.04	0	0	0	0	52.83	156.55	258.58	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	1122.37	(98)
Space heating requirement in kWh/m²/year	12.51	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		1122.37	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	1178.49	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		2168.55	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2276.98	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	34.55	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)

DER WorkSheet: New dwelling design stage

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

Electricity for pumps and fans within dwelling (Table 4f):			
mechanical ventilation - balanced, extract or positive input from outside		218.89	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (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) + (332)...(237b) =		4081.49	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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)			=	466.28	(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) =				466.28	(376)
CO2 associated with electricity for pumps and fans within 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) =				791.19	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				8.82	(384)
EI rating (section 14)					92.13	(385)

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 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)			Volume(m³)	
Ground floor	92.67	(1a)	x	2.54	(2a)	=	235.38	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	92.67	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =			235.38	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

DER WorkSheet: New dwelling design stage

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

Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			3.576	x1/[1/(0.9)+ 0.04]		=	3.11			(27)
Windows Type 2			7.181	x1/[1/(0.9)+ 0.04]		=	6.24			(27)
Windows Type 3			3.098	x1/[1/(0.9)+ 0.04]		=	2.69			(27)
Windows Type 4			3.098	x1/[1/(0.9)+ 0.04]		=	2.69			(27)
Windows Type 5			3.376	x1/[1/(0.9)+ 0.04]		=	2.93			(27)
Floor			92.668	x	0.1	=	9.2668			(28)
Walls Type1	69.2	20.33	48.87	x	0.15	=	7.33			(29)
Walls Type2	4.06	2.1	1.96	x	0.14	=	0.28			(29)
Total area of elements, m²			165.92							(31)
Party wall			34.98	x	0	=	0			(32)
Party ceiling			92.67							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*
*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 37.05 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 14353.68 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 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 4.22 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

DER WorkSheet: New dwelling design stage

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

Total fabric heat loss (33) + (36) = 41.27 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	20.64	20.41	20.19	19.06	18.83	17.7	17.7	17.48	18.16	18.83	19.29	19.74	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	61.91	61.69	61.46	60.33	60.1	58.98	58.98	58.75	59.43	60.1	60.56	61.01	

Average = Sum(39)$_{1...12}$ /12= 60.27 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.67	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.64	0.65	0.65	0.66	

Average = Sum(40)$_{1...12}$ /12= 0.65 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 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 average hot water usage in litres per day Vd,average = (25 x N) + 36 97.39 (43)

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 usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	107.13	103.23	99.33	95.44	91.54	87.65	87.65	91.54	95.44	99.33	103.23	107.13

Total = Sum(44)$_{1...12}$ = 1168.64 (44)

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=	158.86	138.94	143.38	125	119.94	103.5	95.91	110.06	111.37	129.79	141.68	153.85

Total = Sum(45)$_{1...12}$ = 1532.28 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	23.83	20.84	21.51	18.75	17.99	15.52	14.39	16.51	16.71	19.47	21.25	23.08	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

DER WorkSheet: New dwelling design stage

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

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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 calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each 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 DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(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

Output from water heater (annual)$_{1...12}$ | 2183.12 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	97.04	86.14	91.89	84.36	84.1	77.21	76.11	80.81	79.83	87.38	89.9	95.38	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	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)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(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)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(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	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	-106.42	(71)

Water heating gains (Table 5)

(72)m=	130.44	128.19	123.51	117.16	113.04	107.23	102.3	108.62	110.87	117.44	124.86	128.2	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	459	456.85	442.19	418.44	394.18	370.88	355.79	362.01	374.24	398.21	425.78	446.6	(73)

6. Solar gains:

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

DER WorkSheet: New dwelling design stage

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	3.1	x	10.63	x	0.35	x	0.8	=	6.39	(74)
North	0.9x	0.77	x	3.1	x	20.32	x	0.35	x	0.8	=	12.22	(74)
North	0.9x	0.77	x	3.1	x	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	x	74.72	x	0.35	x	0.8	=	44.91	(74)
North	0.9x	0.77	x	3.1	x	79.99	x	0.35	x	0.8	=	48.08	(74)
North	0.9x	0.77	x	3.1	x	74.68	x	0.35	x	0.8	=	44.89	(74)
North	0.9x	0.77	x	3.1	x	59.25	x	0.35	x	0.8	=	35.62	(74)
North	0.9x	0.77	x	3.1	x	41.52	x	0.35	x	0.8	=	24.96	(74)
North	0.9x	0.77	x	3.1	x	24.19	x	0.35	x	0.8	=	14.54	(74)
North	0.9x	0.77	x	3.1	x	13.12	x	0.35	x	0.8	=	7.89	(74)
North	0.9x	0.77	x	3.1	x	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	x	76.57	x	0.35	x	0.8	=	46.03	(78)
South	0.9x	0.77	x	3.1	x	97.53	x	0.35	x	0.8	=	58.63	(78)
South	0.9x	0.77	x	3.1	x	110.23	x	0.35	x	0.8	=	66.27	(78)
South	0.9x	0.77	x	3.1	x	114.87	x	0.35	x	0.8	=	69.05	(78)
South	0.9x	0.77	x	3.1	x	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	x	104.89	x	0.35	x	0.8	=	63.06	(78)
South	0.9x	0.77	x	3.1	x	101.89	x	0.35	x	0.8	=	61.25	(78)
South	0.9x	0.77	x	3.1	x	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	x	40.4	x	0.35	x	0.8	=	24.28	(78)
Southwest	0.9x	0.77	x	3.58	x	36.79		0.35	x	0.8	=	25.53	(79)
Southwest	0.9x	0.77	x	3.58	x	62.67		0.35	x	0.8	=	43.49	(79)
Southwest	0.9x	0.77	x	3.58	x	85.75		0.35	x	0.8	=	59.5	(79)
Southwest	0.9x	0.77	x	3.58	x	106.25		0.35	x	0.8	=	73.73	(79)
Southwest	0.9x	0.77	x	3.58	x	119.01		0.35	x	0.8	=	82.58	(79)
Southwest	0.9x	0.77	x	3.58	x	118.15		0.35	x	0.8	=	81.98	(79)
Southwest	0.9x	0.77	x	3.58	x	113.91		0.35	x	0.8	=	79.04	(79)
Southwest	0.9x	0.77	x	3.58	x	104.39		0.35	x	0.8	=	72.44	(79)
Southwest	0.9x	0.77	x	3.58	x	92.85		0.35	x	0.8	=	64.43	(79)
Southwest	0.9x	0.77	x	3.58	x	69.27		0.35	x	0.8	=	48.06	(79)
Southwest	0.9x	0.77	x	3.58	x	44.07		0.35	x	0.8	=	30.58	(79)
Southwest	0.9x	0.77	x	3.58	x	31.49		0.35	x	0.8	=	21.85	(79)
West	0.9x	0.77	x	7.18	x	19.64	x	0.35	x	0.8	=	27.37	(80)
West	0.9x	0.77	x	7.18	x	38.42	x	0.35	x	0.8	=	53.54	(80)
West	0.9x	0.77	x	7.18	x	63.27	x	0.35	x	0.8	=	88.16	(80)

DER WorkSheet: New dwelling design stage

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

West	0.9x	0.77	x	7.18	x	92.28	x	0.35	x	0.8	=	128.58	(80)
West	0.9x	0.77	x	7.18	x	113.09	x	0.35	x	0.8	=	157.58	(80)
West	0.9x	0.77	x	7.18	x	115.77	x	0.35	x	0.8	=	161.31	(80)
West	0.9x	0.77	x	7.18	x	110.22	x	0.35	x	0.8	=	153.58	(80)
West	0.9x	0.77	x	7.18	x	94.68	x	0.35	x	0.8	=	131.92	(80)
West	0.9x	0.77	x	7.18	x	73.59	x	0.35	x	0.8	=	102.54	(80)
West	0.9x	0.77	x	7.18	x	45.59	x	0.35	x	0.8	=	63.52	(80)
West	0.9x	0.77	x	7.18	x	24.49	x	0.35	x	0.8	=	34.12	(80)
West	0.9x	0.77	x	7.18	x	16.15	x	0.35	x	0.8	=	22.51	(80)
Northwest	0.9x	0.77	x	3.38	x	11.28	x	0.35	x	0.8	=	7.39	(81)
Northwest	0.9x	0.77	x	3.38	x	22.97	x	0.35	x	0.8	=	15.05	(81)
Northwest	0.9x	0.77	x	3.38	x	41.38	x	0.35	x	0.8	=	27.11	(81)
Northwest	0.9x	0.77	x	3.38	x	67.96	x	0.35	x	0.8	=	44.52	(81)
Northwest	0.9x	0.77	x	3.38	x	91.35	x	0.35	x	0.8	=	59.84	(81)
Northwest	0.9x	0.77	x	3.38	x	97.38	x	0.35	x	0.8	=	63.79	(81)
Northwest	0.9x	0.77	x	3.38	x	91.1	x	0.35	x	0.8	=	59.68	(81)
Northwest	0.9x	0.77	x	3.38	x	72.63	x	0.35	x	0.8	=	47.58	(81)
Northwest	0.9x	0.77	x	3.38	x	50.42	x	0.35	x	0.8	=	33.03	(81)
Northwest	0.9x	0.77	x	3.38	x	28.07	x	0.35	x	0.8	=	18.39	(81)
Northwest	0.9x	0.77	x	3.38	x	14.2	x	0.35	x	0.8	=	9.3	(81)
Northwest	0.9x	0.77	x	3.38	x	9.21	x	0.35	x	0.8	=	6.04	(81)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	94.79	170.31	254.16	346.43	413.97	421.63	402.12	350.6	286.2	194.16	115.2	80	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	553.78	627.16	696.35	764.88	808.15	792.51	757.9	712.61	660.44	592.37	540.98	526.6	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	1	0.99	0.97	0.87	0.68	0.48	0.34	0.38	0.62	0.91	0.99	1	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.46	20.59	20.76	20.93	20.99	21	21	21	21	20.91	20.66	20.44	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.37	20.37	20.37	20.38	20.39	20.4	20.4	20.4	20.39	20.39	20.38	20.38	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	1	0.99	0.96	0.84	0.64	0.43	0.3	0.33	0.56	0.89	0.99	1	(89)

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

(90)m=	19.65	19.83	20.07	20.3	20.38	20.4	20.4	20.4	20.39	20.28	19.94	19.62	(90)

fLA = Living area ÷ (4) = | 0.38 | (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

DER WorkSheet: New dwelling design stage

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

(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. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.99	0.99	0.96	0.85	0.65	0.45	0.31	0.35	0.58	0.89	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	550.97	618.51	665.62	649.2	529.22	355.3	237.62	248.52	385.66	529.34	533	524.69	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(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 heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	311.49	215.2	137.35	38.35	4.85	0	0	0	0	49.93	188.14	324.06	

Total per year (kWh/year) = Sum(98)1...5,9...12 =	1269.37	(98)
Space heating requirement in kWh/m²/year	13.7	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		1269.37	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	1332.84	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		2183.12	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2292.27	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	36.25	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)

DER WorkSheet: New dwelling design stage

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Electricity for pumps and fans within dwelling (Table 4f): 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) + (330g) =	253.27	(331)
Energy for lighting (calculated in Appendix L)		384.17	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		4262.56	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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 within 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)
EI rating (section 14)					92.02	(385)

Regulations Compliance Report

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Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 03 August 2022 at 12:36:49

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.38m²

Site Reference : BP Finchley Road **Plot Reference:** 401 BP Finchley Rd

Address : 401 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	29.16 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.08 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	48.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	37.4 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.97 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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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	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.58m²	
Windows facing: South East	2.94m²	
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
Community heating, heat from electric heat pump	

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

Property Address: 103 BP Finchley Rd

Address : 103 BP Finchley Rd, London, NW3 5EY

1. Overall dwelling dimensions:

	Area(m²)			Av. Height(m)			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)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =			125.98	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 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

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Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			6.649	x1/[1/(0.9)+ 0.04]		=	5.78			(27)
Windows Type 2			3.035	x1/[1/(0.9)+ 0.04]		=	2.64			(27)
Walls Type1	27.26	9.68	17.58	x	0.15	=	2.64			(29)
Walls Type2	20.05	2.1	17.95	x	0.14	=	2.54			(29)
Total area of elements, m²			47.31							(31)
Party wall			29.85	x	0	=	0			(32)
Party floor			49.6							(32a)
Party ceiling			49.6							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 16.11 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 6947.17 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 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 4.97 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 21.08 (37)

Ventilation heat loss calculated 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 coefficient, W/K (39)m = (37) + (38)m

(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

Average = $Sum(39)_{1…12}$ /12= 31.25 (39)

DER WorkSheet: New dwelling design stage

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

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.65	0.65	0.64	0.63	0.63	0.62	0.62	0.61	0.62	0.63	0.63	0.64

Average = Sum(40)1…12 /12= 0.63 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 1.68 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 74.06 (43)

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(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

Total = Sum(44)1…12 = 888.72 (44)

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	107.74	117

Total = Sum(45)1…12 = 1165.25 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	18.12	15.85	16.36	14.26	13.68	11.81	10.94	12.55	12.7	14.81	16.16	17.55	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	176.09	155.59	164.31	148.55	146.49	132.2	128.21	138.97	138.19	153.98	161.23	172.28	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	176.09	155.59	164.31	148.55	146.49	132.2	128.21	138.97	138.19	153.98	161.23	172.28	

Output from water heater (annual)$_{1...12}$ 1816.09 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	84.39	75.07	80.48	74.4	74.55	68.97	68.47	72.05	70.96	77.04	78.62	83.12	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	83.92	83.92	83.92	83.92	83.92	83.92	83.92	83.92	83.92	83.92	83.92	83.92	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m=	13.16	11.69	9.51	7.2	5.38	4.54	4.91	6.38	8.56	10.87	12.69	13.53	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m=	146.19	147.71	143.89	135.75	125.48	115.82	109.37	107.85	111.68	119.81	130.09	139.74	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m=	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	31.39	(69)
Pumps and fans gains (Table 5a)													
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m=	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	-67.13	(71)
Water heating gains (Table 5)													
(72)m=	113.43	111.72	108.17	103.34	100.2	95.79	92.03	96.84	98.55	103.55	109.19	111.73	(72)
Total internal gains =				(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m									
(73)m=	320.96	319.29	309.73	294.46	279.23	264.32	254.48	259.25	266.96	282.41	300.14	313.17	(73)

6. Solar gains:

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

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x	0.77	x	3.04	x	36.79	x	0.35	x	0.8	=	21.67	(77)
Southeast 0.9x	0.77	x	3.04	x	62.67	x	0.35	x	0.8	=	36.91	(77)
Southeast 0.9x	0.77	x	3.04	x	85.75	x	0.35	x	0.8	=	50.5	(77)
Southeast 0.9x	0.77	x	3.04	x	106.25	x	0.35	x	0.8	=	62.57	(77)
Southeast 0.9x	0.77	x	3.04	x	119.01	x	0.35	x	0.8	=	70.09	(77)

Southeast	0.9x	0.77	x	3.04	x	118.15	x	0.35	x	0.8	=	69.58	(77)
Southeast	0.9x	0.77	x	3.04	x	113.91	x	0.35	x	0.8	=	67.08	(77)
Southeast	0.9x	0.77	x	3.04	x	104.39	x	0.35	x	0.8	=	61.48	(77)
Southeast	0.9x	0.77	x	3.04	x	92.85	x	0.35	x	0.8	=	54.68	(77)
Southeast	0.9x	0.77	x	3.04	x	69.27	x	0.35	x	0.8	=	40.79	(77)
Southeast	0.9x	0.77	x	3.04	x	44.07	x	0.35	x	0.8	=	25.95	(77)
Southeast	0.9x	0.77	x	3.04	x	31.49	x	0.35	x	0.8	=	18.54	(77)
Southwest	0.9x	0.77	x	6.65	x	36.79		0.35	x	0.8	=	47.47	(79)
Southwest	0.9x	0.77	x	6.65	x	62.67		0.35	x	0.8	=	80.86	(79)
Southwest	0.9x	0.77	x	6.65	x	85.75		0.35	x	0.8	=	110.64	(79)
Southwest	0.9x	0.77	x	6.65	x	106.25		0.35	x	0.8	=	137.08	(79)
Southwest	0.9x	0.77	x	6.65	x	119.01		0.35	x	0.8	=	153.54	(79)
Southwest	0.9x	0.77	x	6.65	x	118.15		0.35	x	0.8	=	152.43	(79)
Southwest	0.9x	0.77	x	6.65	x	113.91		0.35	x	0.8	=	146.96	(79)
Southwest	0.9x	0.77	x	6.65	x	104.39		0.35	x	0.8	=	134.68	(79)
Southwest	0.9x	0.77	x	6.65	x	92.85		0.35	x	0.8	=	119.79	(79)
Southwest	0.9x	0.77	x	6.65	x	69.27		0.35	x	0.8	=	89.37	(79)
Southwest	0.9x	0.77	x	6.65	x	44.07		0.35	x	0.8	=	56.86	(79)
Southwest	0.9x	0.77	x	6.65	x	31.49		0.35	x	0.8	=	40.62	(79)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	69.14	117.77	161.14	199.66	223.63	222.01	214.04	196.16	174.48	130.16	82.81	59.17	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	390.09	437.06	470.87	494.11	502.86	486.33	468.53	455.4	441.44	412.57	382.95	372.34	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.98	0.95	0.88	0.74	0.57	0.4	0.29	0.31	0.48	0.76	0.94	0.98	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.68	20.79	20.9	20.98	21	21	21	21	21	20.98	20.84	20.65	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.39	20.39	20.39	20.4	20.4	20.42	20.42	20.42	20.41	20.4	20.4	20.4	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.97	0.94	0.86	0.71	0.54	0.37	0.25	0.27	0.44	0.72	0.93	0.98	(89)

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

(90)m=	19.97	20.13	20.28	20.38	20.4	20.42	20.42	20.42	20.41	20.38	20.21	19.94	(90)

fLA = Living area ÷ (4) = | 0.62 | (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × 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

DER WorkSheet: New dwelling design stage

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

(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 heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.97	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)m x (84)m													
(95)m=	379.7	411.35	410.51	361.63	281.62	188.7	127.63	133.23	205.39	307.6	356.96	364.62	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	517.44	500.48	451.62	370.66	282.62	188.74	127.63	133.24	205.56	316.31	423.9	512.08	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	102.48	59.9	30.58	6.51	0.74	0	0	0	0	6.48	48.19	109.71	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	364.59	(98)
Space heating requirement in kWh/m²/year	7.35	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		364.59	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	382.82	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		1816.09	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	1906.89	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	22.9	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		121.04	(330a)

DER WorkSheet: New dwelling design stage

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

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	121.04	(331)
Energy for lighting (calculated in Appendix L)		232.42	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		2643.16	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel				400	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x		0.52	=	297.09	(367)
Electrical energy for heat distribution	[(313) x		0.52	=	11.88	(372)
Total CO2 associated with community systems	(363)…(366) + (368)...(372)			=	308.97	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x		0.52	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =				308.97	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	62.82	(378)
CO2 associated with electricity for lighting	(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)
EI rating (section 14)					93.02	(385)

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

Property Address: G02 BP Finchley Rd

Address : G02 BP Finchley Rd, London, NW3 5EY

1. 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)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =			125.59	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 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) x (22a)m

0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			6.649	x1/[1/(0.9)+ 0.04]		=	5.78			(27)
Windows Type 2			3.035	x1/[1/(0.9)+ 0.04]		=	2.64			(27)
Floor			49.444	x	0.1	=	4.9444			(28)
Walls Type1	27.26	9.68	17.58	x	0.15	=	2.64			(29)
Walls Type2	20.81	2.1	18.71	x	0.14	=	2.65			(29)
Total area of elements, m²			97.51							(31)
Party wall			29.03	x	0	=	0			(32)
Party ceiling			49.44							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 21.16 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 8675 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 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 4.22 (36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss (33) + (36) = 25.38 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	11.01	10.89	10.77	10.17	10.05	9.45	9.45	9.33	9.69	10.05	10.29	10.53	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	36.39	36.27	36.15	35.55	35.43	34.82	34.82	34.7	35.06	35.43	35.67	35.91	

Average = Sum(39)$_{1…12}$ /12= 35.52 (39)

DER WorkSheet: New dwelling design stage

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

Heat loss parameter (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

Average = Sum(40)1…12 /12= 0.72 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 1.67 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 73.95 (43)

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 usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(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

Total = Sum(44)1…12 = 887.42 (44)

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=	120.63	105.51	108.87	94.92	91.08	78.59	72.83	83.57	84.57	98.56	107.58	116.83

Total = Sum(45)1…12 = 1163.54 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	18.1	15.83	16.33	14.24	13.66	11.79	10.92	12.54	12.69	14.78	16.14	17.52	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter ‘0’ in (47)

Water storage loss:

a) If manufacturer’s declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer’s declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	175.91	155.44	164.15	148.41	146.35	132.09	128.1	138.85	138.06	153.83	161.08	172.1	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	175.91	155.44	164.15	148.41	146.35	132.09	128.1	138.85	138.06	153.83	161.08	172.1	

Output from water heater (annual)$_{1...12}$ 1814.38 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	84.33	75.02	80.42	74.36	74.5	68.93	68.44	72.01	70.91	76.99	78.57	83.07	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	83.69	83.69	83.69	83.69	83.69	83.69	83.69	83.69	83.69	83.69	83.69	83.69	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	13.12	11.65	9.48	7.17	5.36	4.53	4.89	6.36	8.54	10.84	12.65	13.48	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	145.79	147.3	143.49	135.37	125.13	115.5	109.07	107.56	111.37	119.48	129.73	139.36	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37	31.37	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	-66.95	(71)

Water heating gains (Table 5)

(72)m=	113.35	111.64	108.09	103.27	100.14	95.73	91.98	96.79	98.49	103.48	109.12	111.65	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	320.37	318.7	309.17	293.93	278.74	263.87	254.05	258.81	266.5	281.91	299.6	312.6	(73)

6. Solar gains:

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

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x	0.77	x	3.04	x	36.79	x	0.35	x	0.8	=	21.67	(77)
Southeast 0.9x	0.77	x	3.04	x	62.67	x	0.35	x	0.8	=	36.91	(77)
Southeast 0.9x	0.77	x	3.04	x	85.75	x	0.35	x	0.8	=	50.5	(77)
Southeast 0.9x	0.77	x	3.04	x	106.25	x	0.35	x	0.8	=	62.57	(77)
Southeast 0.9x	0.77	x	3.04	x	119.01	x	0.35	x	0.8	=	70.09	(77)

DER WorkSheet: New dwelling design stage

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Southeast 0.9x	0.77	x	3.04	x	118.15	x	0.35	x	0.8	=	69.58	(77)
Southeast 0.9x	0.77	x	3.04	x	113.91	x	0.35	x	0.8	=	67.08	(77)
Southeast 0.9x	0.77	x	3.04	x	104.39	x	0.35	x	0.8	=	61.48	(77)
Southeast 0.9x	0.77	x	3.04	x	92.85	x	0.35	x	0.8	=	54.68	(77)
Southeast 0.9x	0.77	x	3.04	x	69.27	x	0.35	x	0.8	=	40.79	(77)
Southeast 0.9x	0.77	x	3.04	x	44.07	x	0.35	x	0.8	=	25.95	(77)
Southeast 0.9x	0.77	x	3.04	x	31.49	x	0.35	x	0.8	=	18.54	(77)
Southwest 0.9x	0.77	x	6.65	x	36.79		0.35	x	0.8	=	47.47	(79)
Southwest 0.9x	0.77	x	6.65	x	62.67		0.35	x	0.8	=	80.86	(79)
Southwest 0.9x	0.77	x	6.65	x	85.75		0.35	x	0.8	=	110.64	(79)
Southwest 0.9x	0.77	x	6.65	x	106.25		0.35	x	0.8	=	137.08	(79)
Southwest 0.9x	0.77	x	6.65	x	119.01		0.35	x	0.8	=	153.54	(79)
Southwest 0.9x	0.77	x	6.65	x	118.15		0.35	x	0.8	=	152.43	(79)
Southwest 0.9x	0.77	x	6.65	x	113.91		0.35	x	0.8	=	146.96	(79)
Southwest 0.9x	0.77	x	6.65	x	104.39		0.35	x	0.8	=	134.68	(79)
Southwest 0.9x	0.77	x	6.65	x	92.85		0.35	x	0.8	=	119.79	(79)
Southwest 0.9x	0.77	x	6.65	x	69.27		0.35	x	0.8	=	89.37	(79)
Southwest 0.9x	0.77	x	6.65	x	44.07		0.35	x	0.8	=	56.86	(79)
Southwest 0.9x	0.77	x	6.65	x	31.49		0.35	x	0.8	=	40.62	(79)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	69.14	117.77	161.14	199.66	223.63	222.01	214.04	196.16	174.48	130.16	82.81	59.17	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	389.5	436.47	470.3	493.58	502.37	485.88	468.1	454.96	440.98	412.07	382.42	371.76	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.97	0.92	0.81	0.65	0.46	0.33	0.35	0.55	0.83	0.96	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.54	20.67	20.81	20.94	20.99	21	21	21	21	20.94	20.74	20.52	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.31	20.31	20.31	20.32	20.33	20.34	20.34	20.34	20.33	20.33	20.32	20.32	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.96	0.9	0.78	0.6	0.41	0.28	0.3	0.49	0.79	0.95	0.99	(89)

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

(90)m=	19.71	19.89	20.09	20.26	20.32	20.34	20.34	20.34	20.33	20.27	20	19.68	(90)

fLA = Living area ÷ (4) = | 0.62 | (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × 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)

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

DER WorkSheet: New dwelling design stage

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(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 heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.98	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)m x (84)m													
(95)m=	382.18	418.84	428.3	393.9	315.94	213.84	144.44	150.9	232.08	333.94	364.87	366.32	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	579.46	561.14	507.5	418.82	320.05	214.08	144.45	150.92	232.98	357.34	476.37	574.42	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	146.77	95.62	58.92	17.95	3.06	0	0	0	0	17.4	80.28	154.83	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 574.83 (98)

Space heating requirement in kWh/m²/year 11.63 (99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		574.83	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	603.57	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		1814.38	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	1905.1	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	25.09	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		135.14	(330a)

DER WorkSheet: New dwelling design stage

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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 Appendix L)		231.69	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		2875.5	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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 systems	(363)…(366) + (368)...(372)			=	338.52	(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) =				338.52	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	70.14	(378)
CO2 associated with electricity for lighting	(332))) x		0.52	=	120.25	(379)
Total CO2, kg/year	sum of (376)…(382) =				528.9	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				10.7	(384)
EI rating (section 14)					92.5	(385)

Regulations Compliance Report

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Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 62.73m²

Site Reference : BP Finchley Road **Plot Reference:** 205 BP Finchley Rd

Address : 205 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	24.58 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.55 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	39.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	30.9 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	0.96 (max. 2.00)	1.20 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North	7.61m²
Windows facing: North West	1.67m²
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	

Regulations Compliance Report

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

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Printed on 03 August 2022 at 12:36:51

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 92.67m²

Site Reference : BP Finchley Road **Plot Reference:** G04 BP Finchley Rd

Address : G04 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	23.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.85 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	46.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	33.4 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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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	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	3.58m²
Windows facing: West	7.18m²
Windows facing: North	3.1m²
Windows facing: South	3.1m²
Windows facing: North West	3.38m²
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

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

Property Address: 401 BP Finchley Rd

Address : 401 BP Finchley Rd, London, NW3 5EY

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	49.38	(1a) x	2.54	(2a) =	125.44	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	49.38	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	125.44	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

				Air changes per hour	
Infiltration due to chimneys, flues and fans =	(6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.12	(21)

Infiltration rate modified for monthly wind speed

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

Wind Factor (22a)m = (22)m ÷ 4

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(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

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Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation:	0.5	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)	0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	76.5	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			4.584	x1/[1/(0.9)+ 0.04]		=	3.98			(27)
Windows Type 2			2.936	x1/[1/(0.9)+ 0.04]		=	2.55			(27)
Walls Type1	38.37	7.52	30.85	x	0.15	=	4.63			(29)
Walls Type2	23.86	2.1	21.76	x	0.14	=	3.08			(29)
Roof	49.38	0	49.38	x	0.1	=	4.94			(30)
Total area of elements, m²			111.62							(31)
Party wall			18.73	x	0	=	0			(32)
Party floor			49.38							(32a)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*
*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U)	(26)…(30) + (32) =	21.7	(33)
Heat capacity Cm = S(A x k)	((28)…(30) + (32) + (32a)…(32e) =	6419.43	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	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		5.03	(36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss	(33) + (36) =	26.73	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(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	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	37.73	37.61	37.49	36.89	36.77	36.16	36.16	36.04	36.4	36.77	37.01	37.25	

Average = Sum(39)$_{1…12}$ /12= 36.86 (39)

DER WorkSheet: New dwelling design stage

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Heat loss parameter (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

Average = Sum(40)1…12 /12= 0.75 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 1.67 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 73.91 (43)
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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)													
(44)m=	81.3	78.34	75.39	72.43	69.48	66.52	66.52	69.48	72.43	75.39	78.34	81.3	
										Total = Sum(44)1…12 =		886.92	(44)
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=	120.57	105.45	108.81	94.87	91.03	78.55	72.79	83.52	84.52	98.5	107.52	116.76	
										Total = Sum(45)1…12 =		1162.9	(45)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)													
(46)m=	18.09	15.82	16.32	14.23	13.65	11.78	10.92	12.53	12.68	14.78	16.13	17.51	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	175.84	155.38	164.09	148.36	146.3	132.04	128.06	138.8	138.02	153.78	161.02	172.04	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	175.84	155.38	164.09	148.36	146.3	132.04	128.06	138.8	138.02	153.78	161.02	172.04	

Output from water heater (annual)$_{1...12}$ 1813.74 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	84.31	75	80.4	74.34	74.49	68.91	68.42	71.99	70.9	76.97	78.55	83.05	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	83.6	83.6	83.6	83.6	83.6	83.6	83.6	83.6	83.6	83.6	83.6	83.6	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	13.68	12.15	9.88	7.48	5.59	4.72	5.1	6.63	8.9	11.3	13.19	14.06	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	145.64	147.15	143.34	135.23	125	115.38	108.95	107.44	111.25	119.36	129.59	139.21	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	31.36	31.36	31.36	31.36	31.36	31.36	31.36	31.36	31.36	31.36	31.36	31.36	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	-66.88	(71)

Water heating gains (Table 5)

(72)m=	113.32	111.61	108.07	103.25	100.12	95.71	91.97	96.77	98.47	103.46	109.09	111.62	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	320.72	318.99	309.37	294.04	278.79	263.89	254.1	258.92	266.7	282.2	299.96	312.97	(73)

6. Solar gains:

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast	0.9x	0.77	x	2.94	x	36.79	x	0.35	x	0.8	=	20.96	(77)
Southeast	0.9x	0.77	x	2.94	x	62.67	x	0.35	x	0.8	=	35.71	(77)
Southeast	0.9x	0.77	x	2.94	x	85.75	x	0.35	x	0.8	=	48.85	(77)
Southeast	0.9x	0.77	x	2.94	x	106.25	x	0.35	x	0.8	=	60.53	(77)
Southeast	0.9x	0.77	x	2.94	x	119.01	x	0.35	x	0.8	=	67.8	(77)

DER WorkSheet: New dwelling design stage

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Southeast 0.9x	0.77	x	2.94	x	118.15	x	0.35	x	0.8	=	67.31	(77)
Southeast 0.9x	0.77	x	2.94	x	113.91	x	0.35	x	0.8	=	64.89	(77)
Southeast 0.9x	0.77	x	2.94	x	104.39	x	0.35	x	0.8	=	59.47	(77)
Southeast 0.9x	0.77	x	2.94	x	92.85	x	0.35	x	0.8	=	52.9	(77)
Southeast 0.9x	0.77	x	2.94	x	69.27	x	0.35	x	0.8	=	39.46	(77)
Southeast 0.9x	0.77	x	2.94	x	44.07	x	0.35	x	0.8	=	25.11	(77)
Southeast 0.9x	0.77	x	2.94	x	31.49	x	0.35	x	0.8	=	17.94	(77)
Southwest 0.9x	0.77	x	4.58	x	36.79		0.35	x	0.8	=	32.73	(79)
Southwest 0.9x	0.77	x	4.58	x	62.67		0.35	x	0.8	=	55.75	(79)
Southwest 0.9x	0.77	x	4.58	x	85.75		0.35	x	0.8	=	76.28	(79)
Southwest 0.9x	0.77	x	4.58	x	106.25		0.35	x	0.8	=	94.51	(79)
Southwest 0.9x	0.77	x	4.58	x	119.01		0.35	x	0.8	=	105.86	(79)
Southwest 0.9x	0.77	x	4.58	x	118.15		0.35	x	0.8	=	105.09	(79)
Southwest 0.9x	0.77	x	4.58	x	113.91		0.35	x	0.8	=	101.32	(79)
Southwest 0.9x	0.77	x	4.58	x	104.39		0.35	x	0.8	=	92.85	(79)
Southwest 0.9x	0.77	x	4.58	x	92.85		0.35	x	0.8	=	82.59	(79)
Southwest 0.9x	0.77	x	4.58	x	69.27		0.35	x	0.8	=	61.61	(79)
Southwest 0.9x	0.77	x	4.58	x	44.07		0.35	x	0.8	=	39.2	(79)
Southwest 0.9x	0.77	x	4.58	x	31.49		0.35	x	0.8	=	28.01	(79)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	53.69	91.45	125.13	155.04	173.66	172.4	166.21	152.32	135.49	101.07	64.31	45.95	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	374.41	410.45	434.5	449.08	452.45	436.3	420.32	411.24	402.19	383.27	364.26	358.92	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.98	0.95	0.88	0.73	0.53	0.38	0.4	0.62	0.88	0.97	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.47	20.58	20.73	20.89	20.97	21	21	21	20.99	20.91	20.67	20.45	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.28	20.29	20.29	20.3	20.3	20.31	20.31	20.31	20.31	20.3	20.3	20.29	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.99	0.97	0.94	0.85	0.68	0.47	0.32	0.34	0.56	0.84	0.97	0.99	(89)

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

(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	(90)

fLA = Living area ÷ (4) = 0.62 (91)

Mean internal temperature (for the whole dwelling) = fLA × 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

(93)m=	20.13	20.27	20.44	20.62	20.71	20.74	20.74	20.74	20.73	20.64	20.37	20.11	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.99	0.97	0.94	0.86	0.71	0.51	0.36	0.38	0.59	0.86	0.97	0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	369.12	399.18	409.03	386.51	321.13	221.14	149.6	156.31	239.02	330.03	352.21	354.9	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	597.32	577.86	522.55	432.3	331.25	221.92	149.65	156.39	241.4	369.04	491.21	592.58	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	169.78	120.07	84.46	32.97	7.53	0	0	0	0	29.03	100.08	176.83	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	720.75	(98)
Space heating requirement in kWh/m²/year	14.59	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		720.75	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	756.79	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		1813.74	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	1904.42	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	26.61	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		120.51	(330a)

DER WorkSheet: New dwelling design stage

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

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) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		3023.36	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) 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 systems	(363)…(366) + (368)...(372)			=	359.1	(373)
CO2 associated with space heating (secondary)	(309) x		0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x		0.52	=	0	(375)
Total CO2 associated with space and water heating	(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 of (376)…(382) =				547.06	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				11.08	(384)
EI rating (section 14)					92.23	(385)

Regulations Compliance Report

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

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 03 August 2022 at 12:36:52

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.44m²

Site Reference : BP Finchley Road **Plot Reference:** G02 BP Finchley Rd

Address : G02 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	28.64 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.70 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	33.7 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
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 blind Closed 100% of daylight hours	

10 Key features

Air permeablility	$3.0 m^3/m^2h$
Windows U-value	$0.9 W/m^2K$
Party Walls U-value	$0 W/m^2K$
Floors U-value	$0.1 W/m^2K$
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.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 03 August 2022 at 12:36:50

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 89.7m²

Site Reference : BP Finchley Road **Plot Reference:** 306 BP Finchley Rd

Address : 306 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	23.22 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.82 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	43.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	32.8 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	0.94 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	10.44m²	
Windows facing: East	1.53m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 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)		Volume(m³)	
Ground floor	72.1	(1a) x	2.54	(2a) =	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:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

DER WorkSheet: New dwelling design stage

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

Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation:	0.5	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)	0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	76.5	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			6.582	x1/[1/(0.9)+ 0.04]		=	5.72			(27)
Windows Type 2			6.275	x1/[1/(0.9)+ 0.04]		=	5.45			(27)
Walls Type1	54.49	12.86	41.64	x	0.15	=	6.25			(29)
Walls Type2	30.58	2.1	28.48	x	0.14	=	4.03			(29)
Roof	72.1	0	72.1	x	0.12	=	8.65			(30)
Total area of elements, m²			157.17							(31)
Party wall			13.1	x	0	=	0			(32)
Party floor			72.1							(32a)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U)	(26)…(30) + (32) =	32.62	(33)
Heat capacity Cm = S(A x k)	((28)…(30) + (32) + (32a)…(32e) =	8329.56	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	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		5.76	(36)

if details of thermal bridging are not known (36) = 0.05 x (31)

Total fabric heat loss	(33) + (36) =	38.38	(37)

Ventilation heat loss calculated monthly (38)m = 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	(38)

Heat transfer coefficient, W/K (39)m = (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	

Average = $Sum(39)_{1...12}$ /12= 53.17 (39)

DER WorkSheet: New dwelling design stage

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

Heat loss parameter (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

Average = Sum(40)1…12 /12= 0.74 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N 2.3 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 88.73 (43)

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(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

Total = Sum(44)1…12 = 1064.79 (44)

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=	144.75	126.6	130.64	113.89	109.28	94.3	87.38	100.27	101.47	118.26	129.09	140.18

Total = Sum(45)1…12 = 1396.11 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	21.71	18.99	19.6	17.08	16.39	14.15	13.11	15.04	15.22	17.74	19.36	21.03	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 110 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each 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	147.8	142.66	155.55	154.97	173.53	182.58	195.46	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	200.02	176.52	185.91	167.39	164.56	147.8	142.66	155.55	154.97	173.53	182.58	195.46	

Output from water heater (annual)$_{1...12}$ 2046.95 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	92.35	82.04	87.66	80.66	80.56	74.15	73.28	77.56	76.53	83.54	85.72	90.83	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	114.81	114.81	114.81	114.81	114.81	114.81	114.81	114.81	114.81	114.81	114.81	114.81	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	18.44	16.37	13.32	10.08	7.54	6.36	6.87	8.94	11.99	15.23	17.77	18.95	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	202.16	204.25	198.97	187.71	173.51	160.16	151.24	149.14	154.43	165.68	179.89	193.24	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	34.48	34.48	34.48	34.48	34.48	34.48	34.48	34.48	34.48	34.48	34.48	34.48	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	-91.84	(71)

Water heating gains (Table 5)

(72)m=	124.13	122.08	117.82	112.03	108.28	102.99	98.49	104.25	106.3	112.29	119.05	122.08	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	402.16	400.15	387.55	367.27	346.76	326.95	314.04	319.77	330.16	350.64	374.15	391.71	(73)

6. Solar gains:

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	6.58	x	10.63	x	0.35	x	0.8	=	13.58	(74)
North	0.9x	0.77	x	6.58	x	20.32	x	0.35	x	0.8	=	25.95	(74)
North	0.9x	0.77	x	6.58	x	34.53	x	0.35	x	0.8	=	44.1	(74)
North	0.9x	0.77	x	6.58	x	55.46	x	0.35	x	0.8	=	70.84	(74)
North	0.9x	0.77	x	6.58	x	74.72	x	0.35	x	0.8	=	95.42	(74)

DER WorkSheet: New dwelling design stage

North	0.9x	0.77	x	6.58	x	79.99	x	0.35	x	0.8	=	102.16	(74)
North	0.9x	0.77	x	6.58	x	74.68	x	0.35	x	0.8	=	95.37	(74)
North	0.9x	0.77	x	6.58	x	59.25	x	0.35	x	0.8	=	75.67	(74)
North	0.9x	0.77	x	6.58	x	41.52	x	0.35	x	0.8	=	53.02	(74)
North	0.9x	0.77	x	6.58	x	24.19	x	0.35	x	0.8	=	30.89	(74)
North	0.9x	0.77	x	6.58	x	13.12	x	0.35	x	0.8	=	16.75	(74)
North	0.9x	0.77	x	6.58	x	8.86	x	0.35	x	0.8	=	11.32	(74)
East	0.9x	0.77	x	6.28	x	19.64	x	0.35	x	0.8	=	23.91	(76)
East	0.9x	0.77	x	6.28	x	38.42	x	0.35	x	0.8	=	46.78	(76)
East	0.9x	0.77	x	6.28	x	63.27	x	0.35	x	0.8	=	77.04	(76)
East	0.9x	0.77	x	6.28	x	92.28	x	0.35	x	0.8	=	112.36	(76)
East	0.9x	0.77	x	6.28	x	113.09	x	0.35	x	0.8	=	137.7	(76)
East	0.9x	0.77	x	6.28	x	115.77	x	0.35	x	0.8	=	140.96	(76)
East	0.9x	0.77	x	6.28	x	110.22	x	0.35	x	0.8	=	134.2	(76)
East	0.9x	0.77	x	6.28	x	94.68	x	0.35	x	0.8	=	115.28	(76)
East	0.9x	0.77	x	6.28	x	73.59	x	0.35	x	0.8	=	89.6	(76)
East	0.9x	0.77	x	6.28	x	45.59	x	0.35	x	0.8	=	55.51	(76)
East	0.9x	0.77	x	6.28	x	24.49	x	0.35	x	0.8	=	29.82	(76)
East	0.9x	0.77	x	6.28	x	16.15	x	0.35	x	0.8	=	19.67	(76)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	37.49	72.73	121.14	183.2	233.13	243.12	229.58	190.95	142.63	86.4	46.57	30.99	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	439.65	472.88	508.69	550.47	579.89	570.06	543.62	510.71	472.78	437.04	420.72	422.7	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	1	0.99	0.98	0.94	0.8	0.58	0.42	0.47	0.74	0.96	0.99	1	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.34	20.43	20.6	20.82	20.96	21	21	21	20.98	20.81	20.54	20.32	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.29	20.29	20.3	20.31	20.31	20.32	20.32	20.32	20.32	20.31	20.31	20.3	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	1	0.99	0.98	0.92	0.75	0.52	0.36	0.4	0.68	0.94	0.99	1	(89)

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)

fLA = Living area ÷ (4) = | 0.36 | (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × 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)

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

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(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 heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	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)m x (84)m													
(95)m=	437.58	468.69	496.87	505.86	444.9	309.29	206.62	216.26	329.66	410.67	416.07	421.14	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	840.47	811.86	734.4	609.56	467.52	310.89	206.72	216.48	338.41	517.11	689.17	834.14	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	299.75	230.61	176.72	74.66	16.83	0	0	0	0	79.19	196.63	307.27	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1381.66 (98)

Space heating requirement in kWh/m²/year 19.16 (99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301)

Fraction of space heat from community system 1 – (301) = 1 (302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump 1 (303a)

Fraction of total space heat from Community heat pump (302) x (303a) = 1 (304a)

Factor for control and charging method (Table 4c(3)) for community heating system 1 (305)

Distribution loss factor (Table 12c) for community heating system 1.05 (306)

Space heating **kWh/year**

Annual space heating requirement 1381.66

Space heat from Community heat pump (98) x (304a) x (305) x (306) = 1450.75 (307a)

Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0 (308

Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = 0 (309)

Water heating

Annual water heating requirement 2046.95

If DHW from community scheme:

Water heat from Community heat pump (64) x (303a) x (305) x (306) = 2149.29 (310a)

Electricity used for heat distribution 0.01 × [(307a)…(307e) + (310a)…(310e)] = 36 (313)

Cooling System Energy Efficiency Ratio 0 (314)

Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = 0 (315)

Electricity for pumps and fans within dwelling (Table 4f):

mechanical ventilation - balanced, extract or positive input from outside 175.96 (330a)

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

warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	175.96	(331)
Energy for lighting (calculated in Appendix L)		325.57	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =		4101.57	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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 systems	(363)…(366) + (368)...(372)			=	485.79	(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) =				485.79	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	91.32	(378)
CO2 associated with electricity for lighting	(332))) x		0.52	=	168.97	(379)
Total CO2, kg/year	sum of (376)…(382) =				746.08	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				10.35	(384)
EI rating (section 14)					91.46	(385)

Regulations Compliance Report

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

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Printed on 03 August 2022 at 12:36:51

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 99.23m²

Site Reference : BP Finchley Road **Plot Reference:** G05 BP Finchley Rd

Address : G05 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	26.52 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.43 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.8 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.0 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

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

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.63	
Maximum	1.5	**OK**
MVHR efficiency:	90%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North	14.76m²
Windows facing: North West	1.67m²
Ventilation rate:	2.00
Blinds/curtains:	None

10 Key features

Thermal bridging	0.032 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	

DER WorkSheet: New dwelling design stage

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

User Details:

Assessor Name:	Robyn Berry	**Stroma Number:**	STRO036659
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.5.16

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)	
Ground floor	62.73	(1a)	x	2.54	(2a)	=	159.34	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	62.73	(4)						
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n)	=	159.34	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(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)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
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) ÷ 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 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (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 ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

DER WorkSheet: New dwelling design stage

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

Adjusted infiltration rate (allowing for shelter and wind 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

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 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 balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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	(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)m² x 0.5]

(24d)m=	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)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:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1.2	=	2.52			(26)
Windows Type 1			7.613	x1/[1/(0.9)+ 0.04]		=	6.61			(27)
Windows Type 2			1.667	x1/[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, m²			56.06							(31)
Party wall			37.5	x	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 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 17.12 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 8759.51 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K 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 x (31)

Total fabric heat loss (33) + (36) = 22.74 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m x (5)

	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	11.99	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	

Average = Sum(39)$_{1…12}$ /12= 35.61 (39)

DER WorkSheet: New dwelling design stage

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Heat loss parameter (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

Average = Sum(40)$_{1…12}$ /12= 0.57 (40)

Number of days in month (Table 1a)

	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 heating energy requirement: kWh/year:

Assumed occupancy, N — 2.06 (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 average hot water usage in litres per day Vd,average = (25 x N) + 36 — 83.07 (43)

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 usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	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	

Total = Sum(44)$_{1…12}$ = 996.85 (44)

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=	135.51	118.52	122.3	106.62	102.31	88.29	81.81	93.88	95	110.71	120.85	131.24

Total = Sum(45)$_{1…12}$ = 1307.03 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	20.33	17.78	18.35	15.99	15.35	13.24	12.27	14.08	14.25	16.61	18.13	19.69	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel — 0 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter ‘0’ in (47)

Water storage loss:

a) If manufacturer’s declared loss factor is known (kWh/day): — 0 (48)

Temperature factor from Table 2b — 0 (49)

Energy lost from water storage, kWh/year — (48) x (49) = 110 (50)

b) If manufacturer’s declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) — 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a — 1.03 (52)

Temperature factor from Table 2b — 0.6 (53)

Energy lost from water storage, kWh/year — (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) — 1.03 (55)

Water storage loss calculated 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 cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix 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 (annual) from Table 3 — 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(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)

DER WorkSheet: New dwelling design stage

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Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	190.79	168.45	177.58	160.12	157.59	141.78	137.09	149.15	148.49	165.99	174.34	186.51	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	190.79	168.45	177.58	160.12	157.59	141.78	137.09	149.15	148.49	165.99	174.34	186.51	

Output from water heater (annual)$_{1...12}$ 1957.87 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	89.28	79.35	84.89	78.25	78.24	72.15	71.42	75.44	74.38	81.03	82.98	87.86	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

5. Internal gains (see Table 5 and 5a):

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	102.89	102.89	102.89	102.89	102.89	102.89	102.89	102.89	102.89	102.89	102.89	102.89	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	16.99	15.09	12.27	9.29	6.95	5.86	6.34	8.24	11.05	14.04	16.38	17.46	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	179.78	181.65	176.95	166.94	154.3	142.43	134.5	132.63	137.33	147.34	159.97	171.85	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	33.29	33.29	33.29	33.29	33.29	33.29	33.29	33.29	33.29	33.29	33.29	33.29	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	-82.31	(71)

Water heating gains (Table 5)

(72)m=	120	118.08	114.09	108.68	105.16	100.21	96	101.39	103.31	108.92	115.25	118.09	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	370.64	368.68	357.18	338.77	320.28	302.37	290.7	296.13	305.56	324.16	345.47	361.27	(73)

6. Solar gains:

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

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	7.61	x	10.63	x	0.35	x	0.8	=	15.71	(74)
North	0.9x	0.77	x	7.61	x	20.32	x	0.35	x	0.8	=	30.02	(74)
North	0.9x	0.77	x	7.61	x	34.53	x	0.35	x	0.8	=	51.01	(74)
North	0.9x	0.77	x	7.61	x	55.46	x	0.35	x	0.8	=	81.93	(74)
North	0.9x	0.77	x	7.61	x	74.72	x	0.35	x	0.8	=	110.37	(74)

DER WorkSheet: New dwelling design stage

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North	0.9x	0.77	x	7.61	x	79.99	x	0.35	x	0.8	=	118.16	(74)
North	0.9x	0.77	x	7.61	x	74.68	x	0.35	x	0.8	=	110.31	(74)
North	0.9x	0.77	x	7.61	x	59.25	x	0.35	x	0.8	=	87.52	(74)
North	0.9x	0.77	x	7.61	x	41.52	x	0.35	x	0.8	=	61.33	(74)
North	0.9x	0.77	x	7.61	x	24.19	x	0.35	x	0.8	=	35.73	(74)
North	0.9x	0.77	x	7.61	x	13.12	x	0.35	x	0.8	=	19.38	(74)
North	0.9x	0.77	x	7.61	x	8.86	x	0.35	x	0.8	=	13.09	(74)
Northwest	0.9x	0.77	x	1.67	x	11.28	x	0.35	x	0.8	=	3.65	(81)
Northwest	0.9x	0.77	x	1.67	x	22.97	x	0.35	x	0.8	=	7.43	(81)
Northwest	0.9x	0.77	x	1.67	x	41.38	x	0.35	x	0.8	=	13.38	(81)
Northwest	0.9x	0.77	x	1.67	x	67.96	x	0.35	x	0.8	=	21.98	(81)
Northwest	0.9x	0.77	x	1.67	x	91.35	x	0.35	x	0.8	=	29.55	(81)
Northwest	0.9x	0.77	x	1.67	x	97.38	x	0.35	x	0.8	=	31.5	(81)
Northwest	0.9x	0.77	x	1.67	x	91.1	x	0.35	x	0.8	=	29.47	(81)
Northwest	0.9x	0.77	x	1.67	x	72.63	x	0.35	x	0.8	=	23.49	(81)
Northwest	0.9x	0.77	x	1.67	x	50.42	x	0.35	x	0.8	=	16.31	(81)
Northwest	0.9x	0.77	x	1.67	x	28.07	x	0.35	x	0.8	=	9.08	(81)
Northwest	0.9x	0.77	x	1.67	x	14.2	x	0.35	x	0.8	=	4.59	(81)
Northwest	0.9x	0.77	x	1.67	x	9.21	x	0.35	x	0.8	=	2.98	(81)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	19.36	37.45	64.39	103.91	139.92	149.66	139.78	111.01	77.64	44.81	23.97	16.08	(83)

Total gains – internal and 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. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	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 internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.62	20.69	20.8	20.94	20.99	21	21	21	21	20.94	20.77	20.61	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°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)

Utilisation factor for gains for rest of dwelling, h2,m (see 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 internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 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)

fLA = Living area ÷ (4) = 0.35 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

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

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

DER WorkSheet: New dwelling design stage

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(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 heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.99	0.98	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)m x (84)m													
(95)m=	386.33	399.68	405.34	385.81	314.01	210.19	140.82	147.16	228.7	325.65	360.46	374.48	(95)
Monthly average external temperature from Table 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 for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	582.92	561.62	506.34	416.29	317.33	210.27	140.82	147.17	229.49	354.36	475.36	576.54	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	146.26	108.82	75.15	21.94	2.47	0	0	0	0	21.36	82.72	150.33	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	609.06	(98)
Space heating requirement in kWh/m²/year	9.71	(99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none		0	(301)
Fraction of space heat from community system 1 – (301) =		1	(302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		**kWh/year**	
Annual space heating requirement		609.06	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	639.51	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			
Annual water heating requirement		1957.87	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2055.77	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	26.95	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		153.09	(330a)

DER WorkSheet: New dwelling design stage

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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)...(237b) =		3148.45	(338)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)						
Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second 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 or instantaneous heater	(312) x		0.52	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =				363.7	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	79.45	(378)
CO2 associated with electricity for lighting	(332))) x		0.52	=	155.75	(379)
Total CO2, kg/year	sum of (376)…(382) =				598.9	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				9.55	(384)
EI rating (section 14)					92.55	(385)