DER WorkSheet: New dwelling design stage

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

User Details:

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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

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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			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)

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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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

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

(61)m=	50.96	46.03	50.96	47.89	47.47	43.98	45.45	47.47	47.89	50.96	49.32	50.96	(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=	212.6	187.4	196.85	175.08	169.51	149.29	143.03	159.45	161.21	183.02	193.47	207.5	(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=	212.6	187.4	196.85	175.08	169.51	149.29	143.03	159.45	161.21	183.02	193.47	207.5	

Output from water heater (annual)$_{1...12}$ 2138.41 (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=	66.49	58.51	61.25	54.26	52.44	46.01	43.81	49.1	49.65	56.65	60.26	64.79	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	89.36	87.07	82.32	75.36	70.49	63.9	58.88	65.99	68.96	76.14	83.7	87.08	(72)

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

(73)m=	434.99	432.71	417.38	392.09	366.03	341.1	325.48	332.58	346.13	371.64	400.38	422.11	(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)

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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=	469.09	498.33	529.65	572.9	609.54	601.65	568.8	525.73	481.32	449.99	442.53	450.48	(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	1	0.98	0.89	0.68	0.5	0.56	0.86	0.99	1	1	(86)

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

(87)m=	20.31	20.38	20.53	20.75	20.93	20.99	21	21	20.96	20.75	20.5	20.3	(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	0.97	0.86	0.62	0.43	0.49	0.81	0.98	1	1	(89)

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

(90)m=	19.41	19.52	19.73	20.06	20.29	20.38	20.38	20.38	20.34	20.06	19.69	19.4	(90)

fLA = Living area ÷ (4) = | 0.41 | (91)

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

(92)m=	19.77	19.87	20.06	20.34	20.55	20.63	20.63	20.63	20.59	20.34	20.02	19.76	(92)

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

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(93)m=	19.62	19.72	19.91	20.19	20.4	20.48	20.48	20.48	20.44	20.19	19.87	19.61	(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	0.97	0.86	0.63	0.44	0.5	0.81	0.98	1	1		(94)
Useful gains, hmGm , W = (94)m x (84)m														
(95)m=	468.56	497.26	526.29	555.28	525.22	378.54	252.28	264.04	391.75	441.07	441.31	450.1		(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=	1044.62	1006.79	907.61	750.39	576.34	382.19	252.48	264.54	415.61	635.13	852.04	1035.88		(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m														
(98)m=	428.58	342.41	283.7	140.48	38.04	0	0	0	0	144.39	295.72	435.82		
Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =													2109.13	(98)
Space heating requirement in kWh/m²/year													21.26	(99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year	
Space heating requirement (calculated above)														
	428.58	342.41	283.7	140.48	38.04	0	0	0	0	144.39	295.72	435.82		
(211)m = {[(98)m x (204)] } x 100 ÷ (206)														(211)
	474.62	379.19	314.18	155.57	42.12	0	0	0	0	159.9	327.49	482.63		
Total (kWh/year) =Sum(211)$_{1...5,10...12}$=													2335.7	(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)														
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
Total (kWh/year) =Sum(215)$_{1...5,10...12}$=													0	(215)

Water heating

Output from water heater (calculated above)														
	212.6	187.4	196.85	175.08	169.51	149.29	143.03	159.45	161.21	183.02	193.47	207.5		
Efficiency of water heater													81	(216)
(217)m=	86.99	86.78	86.24	84.89	82.56	81	81	81	81	84.85	86.38	87.08		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m														
(219)m=	244.4	215.96	228.24	206.23	205.32	184.31	176.58	196.85	199.02	215.69	223.98	238.3		
Total = Sum(219a)$_{1...12}$ =													2534.9	(219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		2335.7

DER WorkSheet: New dwelling design stage

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

Water heating fuel used			2534.9	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		242.15		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		272.15	(231)
Electricity for lighting			416.24	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			5558.98	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.216	=	504.51	(261)
Space heating (secondary)	(215)	x	0.519	=	0	(263)
Water heating	(219)	x	0.216	=	547.54	(264)
Space and water heating	(261) + (262) + (263) + (264) =				1052.05	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	141.24	(267)
Electricity for lighting	(232)	x	0.519	=	216.03	(268)
Total CO2, kg/year			sum of (265)…(271) =		1409.32	(272)
Dwelling CO2 Emission Rate			(272) ÷ (4) =		14.2	(273)
EI rating (section 14)					87	(274)

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 12:20:04

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: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	17.27 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.30 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	**OK**
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

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 12:20:05

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: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	17.21 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.88 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	34.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	29.2 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	**OK**
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

9 Summertime temperature

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

Based on:

Overshading:	Average or unknown
Windows facing: South West	6.65m²
Windows facing: South East	3.04m²
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

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

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

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

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=	0.59	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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) — 0 (51)

If community heating see section 4.3

Volume factor from Table 2a — 0 (52)

Temperature factor from Table 2b — 0 (53)

Energy lost from water storage, kWh/year — (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) — 0 (55)

Water storage loss calculated for each month — ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	46.57	40.53	43.18	40.15	39.79	36.87	38.1	39.79	40.15	43.18	43.42	46.57	(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=	182.08	159.05	165.48	146.77	142.1	125.15	119.91	133.67	135.15	153.89	164.27	177.8	(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=	182.08	159.05	165.48	146.77	142.1	125.15	119.91	133.67	135.15	153.89	164.27	177.8	

Output from water heater (annual)$_{1...12}$ 1805.32 (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=	56.7	49.54	51.46	45.49	43.97	38.57	36.73	41.16	41.62	47.61	51.04	55.28	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	76.21	73.72	69.17	63.18	59.09	53.57	49.36	55.33	57.81	63.99	70.89	74.3	(72)

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

(73)m=	329.85	327.32	315.25	296.28	277.21	258.73	247.06	253.06	263.06	282.23	304.11	320.48	(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

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

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=	349.2	364.77	379.65	400.19	417.13	408.39	386.85	364.07	340.7	327.04	328.08	336.55	(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	0.93	0.77	0.54	0.39	0.44	0.7	0.95	0.99	1	(86)

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

(87)m=	20.56	20.62	20.74	20.9	20.99	21	21	21	20.99	20.9	20.71	20.55	(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=	1	0.99	0.98	0.91	0.73	0.5	0.35	0.39	0.65	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	20.12	20.35	20.45	20.47	20.47	20.47	20.46	20.35	20.08	19.84	(90)

fLA = Living area ÷ (4) = 0.35 (91)

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

(92)m=	20.09	20.18	20.33	20.54	20.63	20.65	20.65	20.66	20.65	20.54	20.3	20.08	(92)

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

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

(93)m=	19.94	20.03	20.18	20.39	20.48	20.5	20.5	20.51	20.5	20.39	20.15	19.93	(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	0.91	0.73	0.5	0.35	0.39	0.65	0.93	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	347.57	361.72	371.21	364.77	306.03	204.89	135.61	141.97	222.56	303.1	324.07	335.34	(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=	574.3	553.1	498.2	409.51	311.75	205.06	135.61	141.98	224.15	347.45	467.14	568.03	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	168.69	128.61	94.48	32.21	4.26	0	0	0	0	33	103.01	173.12	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 737.39 (98)

Space heating requirement in kWh/m²/year 11.75 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	168.69	128.61	94.48	32.21	4.26	0	0	0	0	33	103.01	173.12	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	186.81	142.42	104.63	35.67	4.72	0	0	0	0	36.55	114.08	191.72	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 816.6 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)														
	182.08	159.05	165.48	146.77	142.1	125.15	119.91	133.67	135.15	153.89	164.27	177.8		
Efficiency of water heater													81	(216)
(217)m=	85.22	84.91	84.15	82.53	81.24	81	81	81	81	82.5	84.35	85.34		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m														
(219)m=	213.65	187.31	196.65	177.84	174.91	154.51	148.03	165.02	166.85	186.53	194.76	208.35		

Total = Sum(219a)$_{1...12}$ = 2174.43 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		816.6

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

Water heating fuel used			2174.43	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		153.09		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		183.09	(231)
Electricity for lighting			300.09	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			3474.2	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	176.39	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	469.68	(264)
Space and water heating	(261) + (262) + (263) + (264) =			646.06	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	95.02	(267)
Electricity for lighting	(232) x	0.519	=	155.75	(268)
Total CO2, kg/year		sum of (265)…(271) =		896.83	(272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =		14.3	(273)
EI rating (section 14)				89	(274)

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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

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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)

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=	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) = — 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) — 0 (51)

If community heating see section 4.3

Volume factor from Table 2a — 0 (52)

Temperature factor from Table 2b — 0 (53)

Energy lost from water storage, kWh/year — (47) x (51) x (52) x (53) = — 0 (54)

Enter (50) or (54) in (55) — 0 (55)

Water storage loss calculated for each month — ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

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

(61)m=	50.96	46.03	50.14	46.62	46.21	42.81	44.24	46.21	46.62	50.14	49.32	50.96	(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=	208.31	183.65	192.15	170.43	165.01	145.33	139.24	155.22	156.93	178.7	189.65	203.35	(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=	208.31	183.65	192.15	170.43	165.01	145.33	139.24	155.22	156.93	178.7	189.65	203.35	

Output from water heater (annual)$_{1...12}$ | 2087.96 | (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=	65.06	57.27	59.75	52.82	51.05	44.79	42.65	47.8	48.33	55.28	58.99	63.41	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	87.45	85.22	80.32	73.36	68.62	62.21	57.32	64.24	67.13	74.3	81.93	85.23	(72)

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

(73)m=	414.34	412.01	397.05	372.77	348.08	324.45	309.68	316.7	329.65	354.15	381.72	402.24	(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)

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=	441.71	464.58	485.79	512.53	533.02	520.85	493.68	464.83	435.61	416.69	415.56	424.99	(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	0.96	0.83	0.6	0.44	0.48	0.76	0.97	1	1	(86)

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

(87)m=	20.5	20.57	20.69	20.86	20.97	21	21	21	20.99	20.86	20.66	20.49	(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	1	0.99	0.95	0.8	0.55	0.38	0.43	0.71	0.96	1	1	(89)

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

(90)m=	19.77	19.87	20.05	20.3	20.44	20.48	20.48	20.48	20.47	20.31	20.01	19.77	(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=	20.05	20.14	20.3	20.52	20.65	20.68	20.68	20.68	20.67	20.52	20.26	20.05	(92)

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

(93)m=	19.9	19.99	20.15	20.37	20.5	20.53	20.53	20.53	20.52	20.37	20.11	19.9	(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	0.95	0.8	0.56	0.39	0.43	0.72	0.96	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	440.85	462.83	480.34	485.33	425.49	290	192.54	201.48	312.77	399.53	413.32	424.38	(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=	808.93	779	701.54	577	440.68	290.51	192.56	201.52	317.33	489.48	657.6	800.02	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	273.85	212.47	164.57	66	11.3	0	0	0	0	66.93	175.89	279.47	

Total per year (kWh/year) = Sum(98)1...5,9...12 = 1250.48 (98)

Space heating requirement in kWh/m²/year 13.94 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	273.85	212.47	164.57	66	11.3	0	0	0	0	66.93	175.89	279.47	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	303.27	235.29	182.25	73.09	12.51	0	0	0	0	74.11	194.78	309.5	

Total (kWh/year) =Sum(211)1...5,10....12= 1384.81 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)1...5,10....12= 0 (215)

Water heating

Output from water heater (calculated above)

	208.31	183.65	192.15	170.43	165.01	145.33	139.24	155.22	156.93	178.7	189.65	203.35	
Efficiency of water heater												81	(216)
(217)m=	86.03	85.74	85.04	83.4	81.54	81	81	81	81	83.34	85.22	86.13	(217)

Fuel for water heating, kWh/month
(219)m = (64)m x 100 ÷ (217)m

(219)m=	242.13	214.2	225.96	204.36	202.37	179.42	171.9	191.62	193.74	214.42	222.53	236.08

Total = Sum(219a)1...12 = 2498.73 (219)

DER WorkSheet: New dwelling design stage

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

Annual totals		**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1			1384.81	
Water heating fuel used			2498.73	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		218.89		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		248.89	(231)
Electricity for lighting			407.13	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			4539.56	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.216	=	299.12	(261)
Space heating (secondary)	(215)	x	0.519	=	0	(263)
Water heating	(219)	x	0.216	=	539.73	(264)
Space and water heating	(261) + (262) + (263) + (264) =				838.84	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	129.17	(267)
Electricity for lighting	(232)	x	0.519	=	211.3	(268)
Total CO2, kg/year			sum of (265)…(271) =		1179.32	(272)
Dwelling CO2 Emission Rate			(272) ÷ (4) =		13.15	(273)
EI rating (section 14)					88	(274)

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

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

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			6.649	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)

	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=	81.35	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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H													
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	41.45	36.08	38.44	35.74	35.42	32.82	33.92	35.42	35.74	38.44	38.66	41.45	(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=	162.09	141.59	147.31	130.66	126.5	111.42	106.74	118.99	120.31	137	146.24	158.28	(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=	162.09	141.59	147.31	130.66	126.5	111.42	106.74	118.99	120.31	137	146.24	158.28	

Output from water heater (annual)$_{1...12}$ 1607.13 (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=	50.47	44.1	45.81	40.5	39.14	34.34	32.69	36.64	37.05	42.38	45.44	49.21	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	67.84	65.63	61.57	56.24	52.61	47.69	43.94	49.25	51.46	56.96	63.11	66.14	(72)

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

(73)m=	277.86	275.69	265.65	249.9	234.2	218.83	209.01	214.27	222.47	238.39	256.59	270.09	(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

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

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=	347	393.46	426.78	449.55	457.84	440.84	423.06	410.43	396.95	368.55	339.4	329.26	(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	0.86	0.7	0.5	0.36	0.39	0.6	0.88	0.98	0.99	(86)

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

(87)m=	20.46	20.59	20.76	20.91	20.98	21	21	21	21	20.91	20.66	20.43	(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=	0.99	0.98	0.94	0.83	0.66	0.45	0.31	0.33	0.55	0.85	0.97	0.99	(89)

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

(90)m=	19.59	19.78	20.01	20.23	20.31	20.34	20.34	20.34	20.33	20.23	19.9	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	20.29	20.47	20.65	20.73	20.75	20.75	20.75	20.74	20.65	20.37	20.1	(92)

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

(93)m=	19.98	20.14	20.32	20.5	20.58	20.6	20.6	20.6	20.59	20.5	20.22	19.95	(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	0.84	0.67	0.47	0.33	0.35	0.57	0.86	0.97	0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	343.32	383.4	400	377.71	308.26	208.46	139.21	145.68	226.16	316.57	330.18	326.68	(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=	570.56	552.6	499.72	412.4	314.49	208.84	139.23	145.72	227.65	350.81	468.04	565.57	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	169.07	113.7	74.19	24.98	4.64	0	0	0	0	25.48	99.25	177.73	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 689.04 (98)

Space heating requirement in kWh/m²/year 13.94 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	169.07	113.7	74.19	24.98	4.64	0	0	0	0	25.48	99.25	177.73	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	187.23	125.91	82.16	27.66	5.14	0	0	0	0	28.21	109.92	196.82	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 763.06 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)													
	162.09	141.59	147.31	130.66	126.5	111.42	106.74	118.99	120.31	137	146.24	158.28	
Efficiency of water heater												81	(216)
(217)m=	85.5	84.89	83.89	82.36	81.3	81	81	81	81	82.33	84.52	85.67	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	189.59	166.78	175.59	158.64	155.61	137.55	131.78	146.91	148.53	166.4	173.03	184.76	

Total = Sum(219a)$_{1...12}$ = 1935.17 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		763.06

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

Water heating fuel used			1935.17	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		120.66		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		150.66	(231)
Electricity for lighting			231.69	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			3080.57	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	164.82	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	418	(264)
Space and water heating	(261) + (262) + (263) + (264) =			582.82	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	78.19	(267)
Electricity for lighting	(232) x	0.519	=	120.25	(268)
Total CO2, kg/year		sum of (265)…(271) =		781.26	(272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =		15.8	(273)
EI rating (section 14)				89	(274)

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

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

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

	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=	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)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

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

(61)m=	50.96	46.03	50.62	47.07	46.65	43.22	44.66	46.65	47.07	50.62	49.32	50.96	(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=	209.82	184.97	194	172.07	166.59	146.72	140.57	156.7	158.44	180.41	190.99	204.81	(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=	209.82	184.97	194	172.07	166.59	146.72	140.57	156.7	158.44	180.41	190.99	204.81

Output from water heater (annual)1…12 | 2106.1 | (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=	65.56	57.71	60.33	53.33	51.54	45.22	43.06	48.26	48.8	55.81	59.44	63.9	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	88.12	85.87	81.09	74.07	69.28	62.8	57.87	64.86	67.77	75.01	82.55	85.88	(72)

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

(73)m=	419.68	417.53	402.76	378.35	353.41	329.45	314.36	321.25	334.15	358.78	386.46	407.29	(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

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=	514.47	587.84	656.92	724.78	767.38	751.08	716.47	671.85	620.35	552.94	501.66	487.29	(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	0.89	0.71	0.5	0.36	0.4	0.65	0.94	0.99	1	(86)

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

(87)m=	20.42	20.55	20.72	20.91	20.99	21	21	21	20.99	20.88	20.62	20.4	(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	0.97	0.87	0.67	0.45	0.31	0.35	0.6	0.92	0.99	1	(89)

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

(90)m=	19.59	19.77	20.02	20.28	20.37	20.4	20.4	20.4	20.39	20.25	19.88	19.56	(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

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

(92)m=	19.91	20.07	20.29	20.52	20.61	20.63	20.63	20.63	20.62	20.49	20.16	19.88	(92)

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

(93)m=	19.76	19.92	20.14	20.37	20.46	20.48	20.48	20.48	20.47	20.34	20.01	19.73	(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	0.97	0.87	0.68	0.46	0.32	0.36	0.61	0.91	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	512.73	581.98	634.06	629.58	518.55	346.39	228.77	239.7	376.1	505.6	496.61	486.16	(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=	956.96	926.28	838.33	692.15	526.51	346.7	228.78	239.73	378.68	585.69	782.06	947.73	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	330.51	231.37	151.98	45.05	5.92	0	0	0	0	59.59	205.53	343.41	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1373.36 (98)

Space heating requirement in kWh/m²/year 14.82 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	330.51	231.37	151.98	45.05	5.92	0	0	0	0	59.59	205.53	343.41	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	366.01	256.23	168.3	49.89	6.56	0	0	0	0	65.99	227.61	380.3	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 1520.88 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	209.82	184.97	194	172.07	166.59	146.72	140.57	156.7	158.44	180.41	190.99	204.81	
Efficiency of water heater												81	(216)
(217)m=	86.45	85.92	84.84	82.77	81.29	81	81	81	81	83.13	85.57	86.59	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	242.72	215.29	228.67	207.89	204.94	181.14	173.55	193.46	195.6	217.03	223.2	236.54	

Total = Sum(219a)$_{1...12}$ = 2520.03 (219)

DER WorkSheet: New dwelling design stage

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

Annual totals		**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1			1520.88	
Water heating fuel used			2520.03	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		226.14		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		256.14	(231)
Electricity for lighting			384.17	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			4681.23	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	328.51	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	544.33	(264)
Space and water heating	(261) + (262) + (263) + (264) =			872.84	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	132.94	(267)
Electricity for lighting	(232) x	0.519	=	199.39	(268)
Total CO2, kg/year		sum of (265)…(271) =		1205.16	(272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =		13.01	(273)
EI rating (section 14)				88	(274)

Regulations Compliance Report

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

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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: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	16.41 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.15 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**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

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

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

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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			6.649	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)

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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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

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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=	41.51	36.13	38.49	35.79	35.48	32.87	33.97	35.48	35.79	38.49	38.71	41.51	(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=	162.33	141.8	147.53	130.85	126.69	111.58	106.9	119.17	120.49	137.2	146.45	158.51	(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=	162.33	141.8	147.53	130.85	126.69	111.58	106.9	119.17	120.49	137.2	146.45	158.51	

Output from water heater (annual)$_{1...12}$ 1609.48 (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=	50.55	44.17	45.88	40.55	39.2	34.39	32.74	36.7	37.11	42.44	45.5	49.28	(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=	13.33	11.84	9.63	7.29	5.45	4.6	4.97	6.46	8.67	11.01	12.85	13.7	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	67.94	65.72	61.66	56.33	52.68	47.76	44.01	49.32	51.54	57.05	63.2	66.24	(72)
Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m													
(73)m=	278.64	276.45	266.35	250.54	234.78	219.36	209.52	214.81	223.06	239.04	257.31	270.85	(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)

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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	0.7	=	41.54	(79)
Southwest	0.9x	0.77	x	6.65	x	62.67		0.35	x	0.7	=	70.75	(79)
Southwest	0.9x	0.77	x	6.65	x	85.75		0.35	x	0.7	=	96.81	(79)
Southwest	0.9x	0.77	x	6.65	x	106.25		0.35	x	0.7	=	119.95	(79)
Southwest	0.9x	0.77	x	6.65	x	119.01		0.35	x	0.7	=	134.35	(79)
Southwest	0.9x	0.77	x	6.65	x	118.15		0.35	x	0.7	=	133.38	(79)
Southwest	0.9x	0.77	x	6.65	x	113.91		0.35	x	0.7	=	128.59	(79)
Southwest	0.9x	0.77	x	6.65	x	104.39		0.35	x	0.7	=	117.85	(79)
Southwest	0.9x	0.77	x	6.65	x	92.85		0.35	x	0.7	=	104.82	(79)
Southwest	0.9x	0.77	x	6.65	x	69.27		0.35	x	0.7	=	78.2	(79)
Southwest	0.9x	0.77	x	6.65	x	44.07		0.35	x	0.7	=	49.75	(79)
Southwest	0.9x	0.77	x	6.65	x	31.49		0.35	x	0.7	=	35.55	(79)

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

(83)m=	63.2	107.66	147.31	182.52	204.44	202.96	195.67	179.32	159.5	118.99	75.7	54.09	(83)

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

(84)m=	341.84	384.11	413.66	433.06	439.22	422.31	405.2	394.13	382.56	358.03	333.01	324.94	(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	0.93	0.82	0.65	0.46	0.33	0.36	0.55	0.84	0.97	0.99	(86)

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

(87)m=	20.59	20.71	20.84	20.95	20.99	21	21	21	21	20.95	20.76	20.56	(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=	0.99	0.97	0.92	0.79	0.61	0.42	0.29	0.31	0.51	0.81	0.96	0.99	(89)

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

(90)m=	19.84	20.01	20.2	20.35	20.4	20.42	20.42	20.42	20.41	20.36	20.11	19.81	(90)

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

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

(92)m=	20.3	20.44	20.6	20.73	20.77	20.78	20.78	20.78	20.77	20.73	20.51	20.28	(92)

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

(93)m=	20.15	20.29	20.45	20.58	20.62	20.63	20.63	20.63	20.62	20.58	20.36	20.13	(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	0.92	0.8	0.63	0.44	0.3	0.33	0.52	0.82	0.96	0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	337.36	371.78	380.84	347.87	275.59	184.06	123.04	128.67	200.51	293.75	321.14	321.81	(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=	509.27	492.6	444.67	365.21	277.83	184.15	123.05	128.67	200.92	310.85	416.47	503.98	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	127.9	81.19	47.49	12.49	1.67	0	0	0	0	12.73	68.64	135.54	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 487.64 (98)

Space heating requirement in kWh/m²/year 9.83 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	127.9	81.19	47.49	12.49	1.67	0	0	0	0	12.73	68.64	135.54	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	141.64	89.91	52.59	13.83	1.85	0	0	0	0	14.09	76.01	150.1	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 540.02 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)													
	162.33	141.8	147.53	130.85	126.69	111.58	106.9	119.17	120.49	137.2	146.45	158.51	
Efficiency of water heater												81	(216)
(217)m=	84.85	84.16	83.08	81.73	81.11	81	81	81	81	81.71	83.75	85.04	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	191.31	168.49	177.57	160.09	156.19	137.75	131.98	147.12	148.75	167.9	174.87	186.41	

Total = Sum(219a)$_{1...12}$ = 1948.42 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		540.02

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

Water heating fuel used			1948.42	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		121.04		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		151.04	(231)
Electricity for lighting			235.41	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			2874.88	(338)

12a. CO_2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO_2/kWh		**Emissions** kg CO_2/year	
Space heating (main system 1)	(211) x	0.216	=	116.65	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	420.86	(264)
Space and water heating	(261) + (262) + (263) + (264) =			537.5	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	78.39	(267)
Electricity for lighting	(232) x	0.519	=	122.18	(268)
Total CO_2, kg/year		sum of (265)…(271) =		738.07	(272)
Dwelling CO_2 Emission Rate		(272) ÷ (4) =		14.88	(273)
EI rating (section 14)				90	(274)

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 12:20:03

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: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	19.15 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.71 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	**OK**
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

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 12:20:03

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: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	20.07 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.67 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: Boiler systems with radiators or underfloor heating - mains gas
Data from manufacturer
Combi boiler
Efficiency 89.5 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

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

	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			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

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	0.76	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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	41.43	36.06	38.42	35.72	35.4	32.8	33.9	35.4	35.72	38.42	38.64	41.43	(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=	162	141.51	147.23	130.59	126.43	111.35	106.68	118.93	120.24	136.92	146.16	158.19	(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=	162	141.51	147.23	130.59	126.43	111.35	106.68	118.93	120.24	136.92	146.16	158.19	

Output from water heater (annual)$_{1...12}$ 1606.24 (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=	50.45	44.08	45.78	40.47	39.12	34.32	32.68	36.62	37.03	42.36	45.41	49.18	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	67.8	65.59	61.54	56.21	52.58	47.66	43.92	49.22	51.44	56.93	63.07	66.1	(72)

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

(73)m=	278.2	275.97	265.84	250.01	234.25	218.85	209.06	214.38	222.67	238.67	256.93	270.46	(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

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

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=	331.89	367.42	390.97	405.05	407.91	391.25	375.27	366.7	358.16	339.74	321.24	316.4	(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	0.92	0.79	0.59	0.42	0.45	0.68	0.92	0.99	1	(86)

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

(87)m=	20.39	20.5	20.66	20.85	20.96	21	21	21	20.99	20.86	20.6	20.36	(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	0.98	0.96	0.89	0.74	0.53	0.36	0.38	0.62	0.9	0.98	1	(89)

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

(90)m=	19.47	19.64	19.87	20.12	20.26	20.31	20.31	20.31	20.3	20.15	19.78	19.44	(90)

fLA = Living area ÷ (4) = 0.62 (91)

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

(92)m=	20.04	20.17	20.36	20.57	20.69	20.73	20.74	20.74	20.73	20.59	20.28	20.01	(92)

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

(93)m=	19.89	20.02	20.21	20.42	20.54	20.58	20.59	20.59	20.58	20.44	20.13	19.86	(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	0.9	0.76	0.55	0.38	0.41	0.65	0.9	0.98	0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	329.32	361.35	375.91	363.74	309.95	215.15	144.14	150.85	231.78	307.13	315.22	314.55	(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=	588.03	568.78	513.99	424.96	325.14	216.43	144.22	150.98	235.74	361.71	482.35	583.34	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	192.48	139.39	102.73	44.08	11.3	0	0	0	0	40.61	120.33	199.98	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	850.9	(98)
Space heating requirement in kWh/m²/year	17.23	(99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	192.48	139.39	102.73	44.08	11.3	0	0	0	0	40.61	120.33	199.98	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	213.16	154.37	113.77	48.81	12.52	0	0	0	0	44.97	133.25	221.46	
Total (kWh/year) =Sum(211)$_{1...5,10...12}$=													942.3 (211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] } x 100 ÷ (208)													
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0	
Total (kWh/year) =Sum(215)$_{1...5,10...12}$=													0 (215)

Water heating

Output from water heater (calculated above)													
	162	141.51	147.23	130.59	126.43	111.35	106.68	118.93	120.24	136.92	146.16	158.19	
Efficiency of water heater													81 (216)
(217)m=	85.8	85.36	84.58	83.16	81.69	81	81	81	81	82.95	84.95	85.94	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	188.81	165.77	174.07	157.03	154.77	137.47	131.71	146.83	148.45	165.05	172.05	184.07	
Total = Sum(219a)$_{1...12}$ =													1926.09 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		942.3

DER WorkSheet: New dwelling design stage

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

Water heating fuel used			1926.09	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		120.51		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		150.51	(231)
Electricity for lighting			241.63	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			3260.53	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	203.54	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	416.03	(264)
Space and water heating	(261) + (262) + (263) + (264) =			619.57	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	78.12	(267)
Electricity for lighting	(232) x	0.519	=	125.41	(268)
Total CO2, kg/year		sum of (265)…(271) =		823.09	(272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =		16.67	(273)
EI rating (section 14)				88	(274)

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 12:20:05

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: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.45 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.20 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: Boiler systems with radiators or underfloor heating - mains gas
Data from manufacturer
Combi boiler
Efficiency 89.5 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat	
	No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**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

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 12:20:05

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: Mains gas		
Fuel factor: 1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.46 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.01 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	**OK**
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services		**OK**
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

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

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

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) = 0 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

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

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

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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=	49.74	43.29	46.12	42.88	42.5	39.38	40.7	42.5	42.88	46.12	46.38	49.74	(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=	194.49	169.89	176.76	156.77	151.79	133.68	128.08	142.78	144.36	164.38	175.47	189.92	(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=	194.49	169.89	176.76	156.77	151.79	133.68	128.08	142.78	144.36	164.38	175.47	189.92	

Output from water heater (annual)$_{1...12}$ 1928.36 (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=	60.56	52.92	54.97	48.59	46.96	41.2	39.23	43.97	44.46	50.85	54.52	59.04	(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=	3	3	3	3	3	3	3	3	3	3	3	3	(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=	81.4	78.74	73.88	67.49	63.12	57.22	52.73	59.1	61.75	68.35	75.72	79.36	(72)

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

(73)m=	362.44	359.81	346.61	325.72	304.61	284.18	271.28	277.61	288.61	309.7	333.82	351.99	(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)

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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=	399.93	432.55	467.75	508.92	537.73	527.3	500.86	468.56	431.24	396.1	380.39	382.97	(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	0.96	0.84	0.62	0.46	0.51	0.79	0.97	1	1	(86)

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

(87)m=	20.28	20.38	20.55	20.78	20.94	20.99	21	21	20.97	20.77	20.49	20.27	(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	1	0.99	0.94	0.8	0.56	0.39	0.43	0.73	0.96	0.99	1	(89)

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

(90)m=	19.32	19.46	19.71	20.04	20.25	20.32	20.32	20.32	20.29	20.03	19.63	19.31	(90)

fLA = Living area ÷ (4) = 0.36 (91)

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

(92)m=	19.67	19.79	20.01	20.31	20.5	20.56	20.56	20.56	20.54	20.3	19.94	19.65	(92)

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

(93)m=	19.52	19.64	19.86	20.16	20.35	20.41	20.41	20.41	20.39	20.15	19.79	19.5	(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	0.94	0.8	0.57	0.4	0.44	0.74	0.96	0.99	1	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	398.78	430.09	460.25	477.32	429.8	300.82	198.76	208.38	317.91	379.54	377.83	382.15	(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=	828.44	799.88	722.68	598.98	458.65	302.97	198.89	208.66	330.03	506.24	677.41	822.24	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	319.67	248.5	195.25	87.6	21.46	0	0	0	0	94.26	215.7	327.43	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1509.87 (98)

Space heating requirement in kWh/m²/year 20.94 (99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		90.3	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	319.67	248.5	195.25	87.6	21.46	0	0	0	0	94.26	215.7	327.43	
(211)m = {[(98)m x (204)] } x 100 ÷ (206)													(211)
	354.01	275.2	216.22	97.01	23.77	0	0	0	0	104.39	238.87	362.6	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 1672.06 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)													
	194.49	169.89	176.76	156.77	151.79	133.68	128.08	142.78	144.36	164.38	175.47	189.92	
Efficiency of water heater												81	(216)
(217)m=	86.54	86.28	85.63	84.1	82.05	81	81	81	81	84.16	85.88	86.65	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	224.73	196.91	206.42	186.4	185	165.04	158.12	176.27	178.22	195.32	204.33	219.18	

Total = Sum(219a)$_{1...12}$ = 2295.95 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		1672.06

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

Water heating fuel used			2295.95	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		175.96		(230a)
central heating pump:		30		(230c)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		205.96	(231)
Electricity for lighting			325.57	(232)
Total delivered energy for all uses (211)...(221) + (231) + (232)...(237b) =			4499.54	(338)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.216	=	361.17	(261)
Space heating (secondary)	(215)	x	0.519	=	0	(263)
Water heating	(219)	x	0.216	=	495.92	(264)
Space and water heating	(261) + (262) + (263) + (264) =				857.09	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	106.89	(267)
Electricity for lighting	(232)	x	0.519	=	168.97	(268)
Total CO2, kg/year			sum of (265)…(271) =		1132.95	(272)
Dwelling CO2 Emission Rate			(272) ÷ (4) =		15.71	(273)
EI rating (section 14)					87	(274)

Regulations Compliance Report

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

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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: Mains gas		
Fuel factor: 1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.65 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.80 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:	Boiler systems with radiators or underfloor heating - mains gas Data from manufacturer Combi boiler Efficiency 89.5 % SEDBUK2009 Minimum 88.0 %	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water Storage:	No cylinder	
		N/A

Regulations Compliance Report

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

6 Controls

Space heating controls	TTZC by plumbing and electrical services	**OK**
Hot water controls:	No cylinder thermostat No cylinder	
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

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

9 Summertime temperature

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

Based on:

Overshading:	Average or unknown
Windows facing: South West	6.65m²
Windows facing: South East	3.04m²
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
Floors U-value	0.1 W/m²K