

Appendix

SAP DER Worksheets and SBEM
BRUKL documents



DER WORKSHEET

Dwelling Reference: 105
Dwelling Type: New Dwelling Design Stage
105
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	69 (1a) x 2.6	(2a) =	179.4 (3a)
Total floor area TFA			69 (4)
Dwelling volume			179.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	8.97	5175	(28b)
Basement wall	0	0	(29)
External wall	5.75	503.16	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													119.76	(31)
Party Wall													1063.8	(32)
Party floor													0	(32a)
Party ceiling													2070	(32b)
Internal wall **													1083.78	(33c)
Internal floor													0	(32d)
Internal ceiling floor													0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$													31.36	(33)
Heat capacity $C_m = \sum (A \times k)$													9895.74	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K													143.42	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													5.99	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													5.99	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$													37.34	(37)
Ventilation heat loss calculated monthly														
	14.4	14.23	14.05	13.19	13.02	12.16	12.16	11.99	12.51	13.02	13.37	13.71		(38)
Heat transfer coefficient, W/K														
	51.74	51.57	51.4	50.54	50.37	49.51	49.51	49.33	49.85	50.37	50.71	51.06		(39)
Heat loss parameter (HLP), W/m ² K														
	0.75	0.75	0.74	0.73	0.73	0.72	0.72	0.71	0.72	0.73	0.73	0.74		(40)
Number of days in month (Table 1a)														
	31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N													2.22	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)														(42a)
	61.47	60.54	59.2	56.62	54.72	52.6	51.4	52.73	54.2	56.47	59.11	61.23		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)														(42b)
	26.56	26.16	25.61	24.58	23.82	22.97	22.51	23.06	23.66	24.57	25.61	26.47		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)														(42c)
	37.38	36.02	34.66	33.3	31.94	30.58	30.58	31.94	33.3	34.66	36.02	37.38		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)													115.44	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$														
	125.41	122.73	119.47	114.51	110.48	106.15	104.49	107.74	111.16	115.71	120.74	125.08	1383.67	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)														
	198.61	174.76	183.62	156.76	148.73	130.53	126.37	133.4	137.07	157.01	172.02	195.85	1914.73	(45)
Distribution loss (46) = $0.15 \times (45)$														
	29.79	26.21	27.54	23.51	22.31	19.58	18.96	20.01	20.56	23.55	25.8	29.38		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m [(47) - Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
243.64 215.43 228.64 200.33 193.76 174.1 171.4 178.42 180.64 202.04 215.59 240.87 2444.86		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
243.64 215.43 228.64 200.33 193.76 174.1 171.4 178.42 180.64 202.04 215.59 240.87 2444.86		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
102.06 90.64 97.07 86.98 85.47 78.26 78.04 80.38 80.43 88.23 92.05 101.14		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

98.69	109.27	98.69	101.98	98.69	101.98	98.69	98.69	101.98	98.69	101.98	98.69	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

194.95	196.97	191.88	181.02	167.32	154.45	145.85	143.82	148.92	159.77	173.47	186.35	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	(71)
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Water heating gains (Table 5)

137.18	134.89	130.47	120.81	114.88	108.69	104.89	108.03	111.71	118.58	127.85	135.94	(72)
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Total internal gains

490.15	500.45	480.37	463.14	440.22	421.45	405.75	406.87	418.94	436.38	462.63	480.31	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

81.79	160.01	263.51	384.31	470.99	482.14	459.02	394.29	306.47	189.86	101.99	67.26	(83)
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Total gains – internal and solar (watts)

571.94	660.46	743.88	847.45	911.22	903.59	864.78	801.16	725.42	626.24	564.62	547.57	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.94	0.9	0.82	0.67	0.5	0.35	0.25	0.28	0.47	0.74	0.9	0.95	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.14	20.38	20.65	20.88	20.97	21	21	21	20.99	20.84	20.48	20.11	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.3	20.3	20.3	20.31	20.31	20.33	20.33	20.33	20.32	20.31	20.31	20.31	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.93	0.89	0.8	0.64	0.47	0.31	0.21	0.24	0.42	0.71	0.88	0.94	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

19.3	19.59	19.92	20.19	20.29	20.32	20.33	20.33	20.31	20.16	19.73	19.27	(90)
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Living area fraction

												0.18	(91)
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Mean internal temperature (for the whole dwelling)

19.45	19.73	20.04	20.31	20.41	20.44	20.44	20.44	20.43	20.28	19.86	19.42	(92)
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Adjusted mean internal temperature:

19.3	19.58	19.89	20.16	20.26	20.29	20.29	20.29	20.28	20.13	19.71	19.27	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.92	0.87	0.79	0.63	0.47	0.31	0.21	0.24	0.42	0.7	0.87	0.93	(94)
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Useful gains, mGm , W

525.86	575.31	585.54	536.06	423.93	280.92	182.75	191.97	304.73	437.97	490.65	508.57	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

776.25	757.13	688.41	569.26	431.09	281.73	182.84	192.15	307.98	480.01	639.58	769.16	(97)
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Space heating requirement for each month

186.29	122.18	76.53	23.9	5.33	0	0	0	0	31.27	107.23	193.88	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

186.29	122.18	76.53	23.9	5.33	0	0	0	0	31.27	107.23	193.88	(98c)
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Space heating requirement in kWh/m ² /year												10.82	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)												(104)
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0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month							0					0	(107)
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0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m ² /year												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,								0				0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
184.63 121.09 75.85 23.69 5.28 0 0 0 0 30.99 106.27 192.15			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
94.92 94.21 93.14 91.78 91.04 90.8 90.8 90.8 90.8 92.03 93.92 95.04			(217)
Fuel for water heating			
256.69 228.67 245.49 218.27 212.82 191.74 188.76 196.5 198.95 219.52 229.54 253.44		2640.38	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		739.96	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2640.38	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	147.74 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		233.74	(231)
Electricity for lighting		165.5	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
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Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
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Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3779.57	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		26.93 (240a)
Low-rate fraction	0		26.93 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		26.93 (241a)
Low-rate fraction	0		26.93 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		26.93 (242a)

Low-rate fraction	0	26.93	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	96.11	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	38.54	(249)
Energy For lighting	0	27.29	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	280.88	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.89	(257)
SAP rating	85.62	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			155.39	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			554.48	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		709.87	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		32.42	(267)
Electricity for lighting		23.89	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		766.18	(272)
Dwelling CO ₂ Emission Rate		11.1	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			836.16	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2983.62	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3819.78	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			353.6	(281)
Electricity for lighting			253.85	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4427.22	(286)
Dwelling PE Rate			64.16	(287)

Dwelling Reference: 105
Dwelling Type: New Dwelling Design Stage
105
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	69 (1a) x 2.6	(2a) =	179.4 (3a)
Total floor area TFA			69 (4)
Dwelling volume			179.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.11	0.11	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.36	0.36	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.28	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.36	0.35	0.34	0.31	0.3	0.27	0.27	0.26	0.28	0.3	0.32	0.33	3.68	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.56	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.54	0.55	0.55	0.55		(24d)
Effective air change rate														
	0.56	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.54	0.55	0.55	0.55		(25)
Effective air change rate from PCDB:														
	0.56	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.54	0.55	0.55	0.55		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	8.97	5175	(28b)
Basement wall	0	0	(29)
External wall	6.47	503.16	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		119.76	(31)
Party Wall	0	1063.8	(32)
Party floor		0	(32a)
Party ceiling		2070	(32b)
Internal wall **		1083.78	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		32.08	(33)
Heat capacity $C_m = \sum (A \times k)$		9895.74	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		143.42	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		5.99	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		5.99	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		38.06	(37)
Ventilation heat loss calculated monthly			
	33.38 33.23 33.09 32.41 32.29 31.7 31.7 31.59 31.92 32.29 32.54 32.81		(38)
Heat transfer coefficient, W/K			
	71.44 71.29 71.15 70.48 70.35 69.76 69.76 69.65 69.99 70.35 70.6 70.87		(39)
Heat loss parameter (HLP), W/m ² K			
	1.04 1.03 1.03 1.02 1.02 1.01 1.01 1.01 1.01 1.02 1.02 1.03		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.22	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	61.47 60.54 59.2 56.62 54.72 52.6 51.4 52.73 54.2 56.47 59.11 61.23		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	26.56 26.16 25.61 24.58 23.82 22.97 22.51 23.06 23.66 24.57 25.61 26.47		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	37.38 36.02 34.66 33.3 31.94 30.58 30.58 31.94 33.3 34.66 36.02 37.38		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		115.44	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	125.41 122.73 119.47 114.51 110.48 106.15 104.49 107.74 111.16 115.71 120.74 125.08	1383.67	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	198.61 174.76 183.62 156.76 148.73 130.53 126.37 133.4 137.07 157.01 172.02 195.85	1914.73	(45)
Distribution loss (46) = $0.15 \times (45)$			
	29.79 26.21 27.54 23.51 22.31 19.58 18.96 20.01 20.56 23.55 25.8 29.38		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
245.21 216.85 230.21 201.85 195.33 175.62 172.97 180 182.16 203.61 217.11 242.44 2463.35		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
28.1 24.85 26.02 21.55 20.08 17.19 16.11 17.13 17.78 20.96 23.75 27.58		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
217.11 192 204.19 180.3 175.24 158.43 156.86 162.87 164.38 182.65 193.36 214.86 2202.25		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
103.31 91.78 98.33 88.2 86.73 79.47 79.29 81.63 81.65 89.48 93.27 102.4		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

100.3	111.05	100.3	103.65	100.3	103.65	100.3	100.3	103.65	100.3	103.65	100.3	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

194.95	196.97	191.88	181.02	167.32	154.45	145.85	143.82	148.92	159.77	173.47	186.35	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	(71)
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Water heating gains (Table 5)

138.86	136.57	132.16	122.49	116.57	110.38	106.58	109.72	113.4	120.27	129.54	137.63	(72)
--------	--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	------

Total internal gains

493.44	503.92	483.67	466.49	443.52	424.8	409.05	410.17	422.3	439.67	465.99	483.61	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

75.15	147.01	242.1	353.09	432.72	442.97	421.73	362.26	281.57	174.44	93.7	61.8	(83)
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Total gains – internal and solar (watts)

568.59	650.93	725.77	819.58	876.25	867.77	830.78	772.43	703.87	614.11	559.69	545.4	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.96	0.94	0.89	0.8	0.66	0.49	0.36	0.4	0.62	0.85	0.94	0.97	(86)
------	------	------	-----	------	------	------	-----	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.44	19.7	20.07	20.52	20.81	20.95	20.99	20.98	20.89	20.48	19.89	19.39	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.05	20.06	20.06	20.07	20.07	20.07	20.07	20.08	20.07	20.07	20.06	20.06	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.95	0.93	0.88	0.77	0.61	0.43	0.29	0.33	0.55	0.81	0.93	0.96	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

18.24	18.58	19.04	19.57	19.9	20.04	20.07	20.07	19.98	19.55	18.83	18.19	(90)
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Living area fraction

												0.18	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

18.45	18.77	19.22	19.74	20.06	20.2	20.23	20.23	20.14	19.71	19.01	18.4	(92)
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Adjusted mean internal temperature:

18.45	18.77	19.22	19.74	20.06	20.2	20.23	20.23	20.14	19.71	19.01	18.4	(93)
-------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	------	------

8. Space heating requirement

Utilisation factor for gains,

0.94	0.91	0.86	0.75	0.61	0.44	0.3	0.34	0.56	0.8	0.91	0.95	(94)
------	------	------	------	------	------	-----	------	------	-----	------	------	------

Useful gains, mGm , W

534.14	592.29	623.06	618.12	533.29	378.42	250.8	262.81	393.31	490.86	508.54	515.86	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

1011.15	989.01	904.98	763.71	587.86	390.6	253.17	266.5	422.81	641.02	841.17	1006.53	(97)
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Space heating requirement for each month

354.89	266.6	209.74	104.83	40.6	0	0	0	0	111.72	239.49	365.06	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

354.89	266.6	209.74	104.83	40.6	0	0	0	0	111.72	239.49	365.06	(98c)
--------	-------	--------	--------	------	---	---	---	---	--------	--------	--------	-------

Space heating requirement in kWh/m ² /year												24.54	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	384.5	288.84	227.24	113.57	43.99	0	0	0	0	121.04	259.47	395.52			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	85.15	84.8	84.12	82.89	81.35	79.8	79.8	79.8	79.8	82.99	84.54	85.24			(217)	
Fuel for water heating																
	254.96	226.42	242.74	217.52	215.42	198.54	196.56	204.09	205.99	220.07	228.72	252.07	2663.11		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													1834.17	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2663.11	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													168.2	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

13.08	19.8	30.53	36.91	42.12	40.17	39.69	36.31	30.77	23.74	14.85	11.15	339.12	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

3.76	8.16	16.69	25.79	34.81	35.24	34.82	29.15	20.94	11.9	5.09	2.96	229.29	(233b)
------	------	-------	-------	-------	-------	-------	-------	-------	------	------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			4183.06	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.76	(240a)
Low-rate fraction	0		66.76	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.76	(241a)
Low-rate fraction	0		66.76	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.76	(242a)

Low-rate fraction	0	66.76	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	96.94	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	27.74	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-68.72	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	228.9	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.72	(257)
SAP rating	88.28	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			385.18	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			559.25	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		944.43	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		24.28	(268)
energy saved or generated	0	-73.83	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		906.81	(272)
Dwelling CO ₂ Emission Rate		13.14	(273)
EI rating		89	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			2072.61	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3009.32	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			5081.93	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			257.99	(282)
energy saved or generated	0		-611.21	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4858.81	(286)
Dwelling PE Rate			70.42	(287)

Dwelling Reference: 401
Dwelling Type: New Dwelling Design Stage
 401
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	102 (1a) x 2.6	(2a) =	265.2 (3a)
Total floor area TFA			102 (4)
Dwelling volume			265.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	24.35		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	13.21	1155.56	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²													106.11	(31)												
Party Wall													0	513	(32)											
Party floor													4080	(32a)												
Party ceiling													3060	(32b)												
Internal wall **													1603.8	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\Sigma (A \times U)$													39.86	(33)												
Heat capacity Cm = $\Sigma(A \times k)$													10412.36	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.08	(35)												
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K													5.31	(36)												
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available													5.31	(36a)												
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$													45.17	(37)												
Ventilation heat loss calculated monthly																										
													22.54	22.26	21.98	20.59	20.31	18.91	18.91	18.64	19.47	20.31	20.87	21.43	(38)	
Heat transfer coefficient, W/K																										
													67.71	67.43	67.15	65.76	65.48	64.08	64.08	63.8	64.64	65.48	66.03	66.59	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.66	0.66	0.66	0.64	0.64	0.63	0.63	0.63	0.63	0.64	0.65	0.65	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.76	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	70.45	69.39	67.85	64.9	62.72	60.29	58.91	60.44	62.12	64.73	67.74	70.18		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	30.42	29.97	29.33	28.16	27.28	26.31	25.78	26.41	27.1	28.14	29.34	30.32		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	42.87	41.31	39.75	38.19	36.63	35.07	35.07	36.63	38.19	39.75	41.31	42.87		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													132.31	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	143.74	140.67	136.93	131.25	126.63	121.67	119.76	123.48	127.41	132.62	138.39	143.36	1585.9	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	227.64	200.31	210.46	179.67	170.47	149.61	144.84	152.9	157.11	179.96	197.16	224.47	2194.6	(45)
Distribution loss (46) = 0.15 x (45)														
	34.15	30.05	31.57	26.95	25.57	22.44	21.73	22.93	23.57	26.99	29.57	33.67		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m [(47) - Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
272.67 240.98 255.48 223.24 215.49 193.18 189.87 197.92 200.68 224.99 240.73 269.5 2724.72		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
272.67 240.98 255.48 223.24 215.49 193.18 189.87 197.92 200.68 224.99 240.73 269.5 2724.72		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
111.71 99.14 106 94.6 92.7 84.6 84.18 86.86 87.1 95.86 100.41 110.66		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

130.9 144.92 130.9 135.26 130.9 135.26 130.9 130.9 135.26 130.9 135.26 130.9 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

259.52 262.21 255.43 240.98 222.74 205.6 194.15 191.46 198.25 212.69 230.93 248.07 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 (71)

Water heating gains (Table 5)

150.15 147.52 142.47 131.39 124.6 117.5 113.14 116.74 120.97 128.84 139.46 148.73 (72)

Total internal gains

607.93 622.02 596.15 574.99 545.6 522.73 502.55 503.46 518.83 539.79 573.01 595.06 (73)

6. Solar gains

Solar gains in watts, calculated for each month

138.96 271.83 447.67 652.9 800.16 819.11 779.82 669.86 520.66 322.56 173.27 114.27 (83)

Total gains – internal and solar (watts)

746.89 893.86 1043.83 1227.89 1345.76 1341.83 1282.38 1173.32 1039.5 862.35 746.28 709.33 (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, $\eta_{1,m}$ (see Table 9a)

0.92 0.86 0.77 0.6 0.44 0.3 0.22 0.25 0.42 0.69 0.87 0.93 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.95 20.26 20.59 20.86 20.96 20.99 21 21 20.98 20.8 20.36 19.91 (87)

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

20.37 20.38 20.38 20.39 20.39 20.4 20.4 20.41 20.4 20.39 20.39 20.38 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.91 0.85 0.75 0.58 0.41 0.28 0.19 0.22 0.39 0.67 0.86 0.92 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.14 19.51 19.92 20.24 20.36 20.4 20.4 20.41 20.38 20.19 19.66 19.09 (90)

Living area fraction

0.21 (91)

Mean internal temperature (for the whole dwelling)

19.31 19.67 20.06 20.38 20.49 20.53 20.53 20.53 20.51 20.32 19.81 19.27 (92)

Adjusted mean internal temperature:

19.16 19.52 19.91 20.23 20.34 20.38 20.38 20.38 20.36 20.17 19.66 19.12 (93)

8. Space heating requirement

Utilisation factor for gains,

0.89	0.83	0.73	0.57	0.41	0.27	0.19	0.22	0.38	0.66	0.84	0.9	(94)
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Useful gains, mGm , W

666.85	743	764.38	699.93	554.65	368.61	242.01	253.62	398.73	565.37	624.19	641.69	(95)
--------	-----	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

1006.08	985.94	900.38	744.76	565.52	370.15	242.25	254.04	404.54	626.58	829.14	993.24	(97)
---------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

252.39	163.26	101.18	32.28	8.09	0	0	0	0	45.54	147.56	261.56	(98a)
--------	--------	--------	-------	------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

252.39	163.26	101.18	32.28	8.09	0	0	0	0	45.54	147.56	261.56	(98c)
--------	--------	--------	-------	------	---	---	---	---	-------	--------	--------	-------

Space heating requirement in kWh/m ² /year												9.92	(99)
---	--	--	--	--	--	--	--	--	--	--	--	------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
250.14 161.8 100.28 31.99 8.02 0 0 0 0 45.14 146.24 259.22			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
95.39 94.63 93.45 91.96 91.13 90.8 90.8 90.8 90.8 92.36 94.39 95.51			(217)
Fuel for water heating			
285.85 254.66 273.38 242.75 236.47 212.75 209.1 217.98 221.01 243.61 255.04 282.17		2934.76	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		1002.82	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2934.76	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	222.44 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		308.44	(231)
Electricity for lighting		219.5	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	4465.53	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		36.5	(240a)
Low-rate fraction	0		36.5	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		36.5	(241a)
Low-rate fraction	0		36.5	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		36.5	(242a)

Low-rate fraction	0	36.5	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	106.83	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	50.86	(249)
Energy For lighting	0	36.2	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	322.39	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.79	(257)
SAP rating	87.2	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			210.59	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			616.3	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		826.89	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		42.78	(267)
Electricity for lighting		31.68	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		901.36	(272)
Dwelling CO ₂ Emission Rate		8.84	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			1133.19	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3316.28	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4449.47	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			466.6	(281)
Electricity for lighting			336.68	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5252.76	(286)
Dwelling PE Rate			51.5	(287)

Dwelling Reference: 401
Dwelling Type: New Dwelling Design Stage
401
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	102 (1a) x	2.6 (2a) =	265.2 (3a)
Total floor area TFA			102 (4)
Dwelling volume			265.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	4	x 10 =	40	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.4	0.4	(18)
Number of sides on which dwelling is sheltered		2	2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.34	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.43	0.43	0.42	0.37	0.37	0.32	0.32	0.32	0.34	0.37	0.38	0.4	4.47	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(24d)
Effective air change rate														
	0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25)
Effective air change rate from PCDB:														
	0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	24.35		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	14.86	1155.56	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													106.11	(31)												
Party Wall													0	513	(32)											
Party floor													4080	(32a)												
Party ceiling													3060	(32b)												
Internal wall **													1603.8	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\sum (A \times U)$													41.51	(33)												
Heat capacity Cm = $\sum(A \times k)$													10412.36	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.08	(35)												
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													5.31	(36)												
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													5.31	(36a)												
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													46.82	(37)												
Ventilation heat loss calculated monthly																										
													52.02	51.69	51.38	49.9	49.63	48.34	48.34	48.1	48.84	49.63	50.19	50.77	(38)	
Heat transfer coefficient, W/K																										
													98.83	98.51	98.2	96.72	96.45	95.16	95.16	94.92	95.66	96.45	97	97.59	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.97	0.97	0.96	0.95	0.95	0.93	0.93	0.93	0.94	0.95	0.95	0.96	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.76	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	70.45	69.39	67.85	64.9	62.72	60.29	58.91	60.44	62.12	64.73	67.74	70.18		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	30.42	29.97	29.33	28.16	27.28	26.31	25.78	26.41	27.1	28.14	29.34	30.32		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	42.87	41.31	39.75	38.19	36.63	35.07	35.07	36.63	38.19	39.75	41.31	42.87		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													132.31	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	143.74	140.67	136.93	131.25	126.63	121.67	119.76	123.48	127.41	132.62	138.39	143.36	1585.9	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	227.64	200.31	210.46	179.67	170.47	149.61	144.84	152.9	157.11	179.96	197.16	224.47	2194.6	(45)
Distribution loss (46) = 0.15 x (45)														
	34.15	30.05	31.57	26.95	25.57	22.44	21.73	22.93	23.57	26.99	29.57	33.67		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is V _{ww} from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
274.24 242.39 257.05 224.76 217.06 194.7 191.44 199.49 202.2 226.56 242.25 271.07 2743.21		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
32.21 28.48 29.83 24.7 23.02 19.7 18.46 19.63 20.38 24.02 27.22 31.61		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
242.03 213.91 227.22 200.06 194.05 175 172.97 179.86 181.82 202.53 215.04 239.46 2443.96		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
112.97 100.27 107.25 95.81 93.96 85.82 85.44 88.11 88.31 97.11 101.63 111.91		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

131.32 145.4 131.32 135.7 131.32 135.7 131.32 131.32 135.7 131.32 135.7 131.32 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

259.52 262.21 255.43 240.98 222.74 205.6 194.15 191.46 198.25 212.69 230.93 248.07 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 (71)

Water heating gains (Table 5)

151.84 149.21 144.16 133.07 126.29 119.19 114.83 118.43 122.66 130.53 141.15 150.42 (72)

Total internal gains

610.04 624.18 598.27 577.12 547.71 524.86 504.67 505.58 520.96 541.91 575.14 597.18 (73)

6. Solar gains

Solar gains in watts, calculated for each month

127.67 249.75 411.3 599.86 735.15 752.55 716.46 615.43 478.36 296.35 159.19 104.99 (83)

Total gains – internal and solar (watts)

737.71 873.93 1009.57 1176.97 1282.86 1277.41 1221.13 1121.01 999.32 838.25 734.33 702.16 (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, $\eta_{1,m}$ (see Table 9a)

0.95 0.91 0.86 0.75 0.6 0.45 0.33 0.38 0.58 0.81 0.92 0.95 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19 19.34 19.83 20.38 20.74 20.92 20.98 20.97 20.83 20.32 19.57 18.95 (87)

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

20.11 20.11 20.11 20.13 20.13 20.14 20.14 20.14 20.14 20.13 20.12 20.12 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.94 0.9 0.84 0.72 0.56 0.4 0.27 0.31 0.53 0.78 0.91 0.95 (89)

Roof

Mean internal temperature in the rest of dwelling T2

17.76 18.2 18.79 19.47 19.88 20.08 20.13 20.12 19.99 19.41 18.5 17.71 (90)

Living area fraction

0.21 (91)

Mean internal temperature (for the whole dwelling)

18.02 18.44 19.01 19.67 20.07 20.26 20.31 20.3 20.17 19.61 18.73 17.97 (92)

Adjusted mean internal temperature:

18.02 18.44 19.01 19.67 20.07 20.26 20.31 20.3 20.17 19.61 18.73 17.97 (93)

8. Space heating requirement

Utilisation factor for gains,

0.92	0.88	0.82	0.7	0.56	0.4	0.28	0.32	0.53	0.76	0.88	0.93	(94)
------	------	------	-----	------	-----	------	------	------	------	------	------	------

Useful gains, mGm , W

676.4	767.7	823.65	826.29	718.5	515	346.86	361.55	527.35	639.7	647.58	649.61	(95)
-------	-------	--------	--------	-------	-----	--------	--------	--------	-------	--------	--------	------

Monthly average external temperature from Table U1

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

1356.31	1333.86	1228.85	1041.41	806.83	538.54	352.75	370.28	580.71	868.61	1127.92	1343.89	(97)
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Space heating requirement for each month

505.85	380.46	301.47	154.88	65.72	0	0	0	0	170.31	345.85	516.54	(98a)
--------	--------	--------	--------	-------	---	---	---	---	--------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

505.85	380.46	301.47	154.88	65.72	0	0	0	0	170.31	345.85	516.54	(98c)
--------	--------	--------	--------	-------	---	---	---	---	--------	--------	--------	-------

Space heating requirement in kWh/m ² /year												23.93	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													92.3	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fuel (main heating system 1), kWh/month	0												0		
	548.05	412.2	326.62	167.8	71.2	0	0	0	0	184.52	374.7	559.64			(211)
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0			(213)
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0			(215)
Output from water heater),	0												79.8	(216)	
Efficiency of water heater															
	85.67	85.34	84.69	83.49	81.9	79.8	79.8	79.8	79.8	83.67	85.12	85.74			(217)
Fuel for water heating															
	282.51	250.67	268.29	239.62	236.93	219.3	216.76	225.39	227.85	242.05	252.63	279.29	2941.28		(219)
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0			(221)
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													2644.72	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													2941.28	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													41	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													86	(231)	
Electricity for lighting													220.22	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

19.01	28.6	43.84	52.66	59.76	56.86	56.15	51.5	43.88	34.13	21.52	16.23	484.14	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

5.88	12.73	25.97	40.03	53.96	54.62	54	45.26	32.56	18.55	7.96	4.63	356.13	(233b)
------	-------	-------	-------	-------	-------	----	-------	-------	-------	------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			5051.95	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		96.27	(240a)
Low-rate fraction	0		96.27	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		96.27	(241a)
Low-rate fraction	0		96.27	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		96.27	(242a)

Low-rate fraction	0	96.27	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	107.06	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	36.31	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-99.74	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	246.09	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.6	(257)
SAP rating	90.23	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			555.39	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			617.67	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		1173.06	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		31.78	(268)
energy saved or generated	0	-109.08	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		1107.69	(272)
Dwelling CO ₂ Emission Rate		10.86	(273)
EI rating		90	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			2988.53	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3323.64	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			6312.17	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			337.78	(282)
energy saved or generated	0		-886.11	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5893.95	(286)
Dwelling PE Rate			57.78	(287)

Dwelling Reference: 402
Dwelling Type: New Dwelling Design Stage
402
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	58 (1a) x 2.6	(2a) =	150.8 (3a)
Total floor area TFA			58 (4)
Dwelling volume			150.8 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.32	290.92	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²												32.67	(31)	
Party Wall												0	1069.2	(32)
Party floor												2320	(32a)	
Party ceiling												1740	(32b)	
Internal wall **												1069.2	(33c)	
Internal floor												0	(32d)	
Internal ceiling floor												0	(32e)	
Fabric heat loss, W/K = $\sum (A \times U)$												16.58	(33)	
Heat capacity Cm = $\sum(A \times k)$												6489.32	(34)	
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K												111.88	(35)	
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K												1.63	(36)	
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available												1.63	(36a)	
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$												18.21	(37)	
Ventilation heat loss calculated monthly														
12.1 11.96 11.81 11.09 10.95 10.22 10.22 10.08 10.51 10.95 11.24 11.53													(38)	
Heat transfer coefficient, W/K														
30.31 30.17 30.02 29.3 29.16 28.43 28.43 28.29 28.72 29.16 29.45 29.74													(39)	
Heat loss parameter (HLP), W/m ² K														
0.52 0.52 0.52 0.51 0.5 0.49 0.49 0.49 0.5 0.5 0.51 0.51													(40)	
Number of days in month (Table 1a)														
31 28 31 30 31 30 31 31 30 31 30 31													(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.92	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	56.49	55.64	54.4	52.04	50.29	48.34	47.23	48.46	49.81	51.9	54.32	56.27		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	24.41	24.05	23.54	22.6	21.9	21.11	20.69	21.2	21.75	22.59	23.55	24.33		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	34.34	33.09	31.84	30.59	29.34	28.1	28.1	29.34	30.59	31.84	33.09	34.34		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													106.08	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	115.24	112.78	109.79	105.23	101.53	97.55	96.02	99	102.15	106.33	110.95	114.94	1271.52	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	182.52	160.6	168.74	144.05	136.68	119.95	116.13	122.59	125.96	144.29	158.08	179.97	1759.55	(45)
Distribution loss (46) = 0.15 x (45)														
	27.38	24.09	25.31	21.61	20.5	17.99	17.42	18.39	18.89	21.64	23.71	27		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
227.54 201.27 213.76 187.63 181.7 163.52 161.15 167.61 169.53 189.31 201.65 225 2289.67		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
227.54 201.27 213.76 187.63 181.7 163.52 161.15 167.61 169.53 189.31 201.65 225 2289.67		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
96.71 85.93 92.12 82.76 81.46 74.74 74.63 76.78 76.74 83.99 87.42 95.86		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

86.12 95.34 86.12 88.99 86.12 88.99 86.12 86.12 88.99 86.12 88.99 86.12 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

167.88 169.62 165.23 155.88 144.09 133 125.59 123.85 128.24 137.58 149.38 160.47 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 (71)

Water heating gains (Table 5)

129.98 127.88 123.82 114.94 109.5 103.81 100.31 103.2 106.58 112.9 121.41 128.85 (72)

Total internal gains

438.84 447.71 430.04 414.68 394.57 377.66 363.89 365.03 375.68 391.47 414.65 430.3 (73)

6. Solar gains

Solar gains in watts, calculated for each month

61.35 120.01 197.63 288.24 353.24 361.61 344.27 295.72 229.86 142.4 76.49 50.45 (83)

Total gains – internal and solar (watts)

500.19 567.71 627.67 702.91 747.81 739.27 708.16 660.75 605.53 533.86 491.14 480.75 (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, $\eta_{1,m}$ (see Table 9a)

0.84 0.76 0.66 0.5 0.36 0.25 0.18 0.2 0.33 0.55 0.75 0.85 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.64 20.78 20.9 20.98 21 21 21 21 21 20.97 20.83 20.62 (87)

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

20.5 20.5 20.5 20.52 20.52 20.53 20.53 20.53 20.53 20.52 20.51 20.51 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.82 0.75 0.64 0.48 0.34 0.23 0.16 0.18 0.3 0.53 0.73 0.84 (89)

Roof

Mean internal temperature in the rest of dwelling T2

20.08 20.25 20.4 20.49 20.51 20.53 20.53 20.53 20.52 20.49 20.33 20.07 (90)

Living area fraction

0.37 (91)

Mean internal temperature (for the whole dwelling)

20.29 20.45 20.58 20.67 20.69 20.71 20.71 20.71 20.7 20.67 20.52 20.28 (92)

Adjusted mean internal temperature:

20.14 20.3 20.43 20.52 20.54 20.56 20.56 20.56 20.55 20.52 20.37 20.13 (93)

8. Space heating requirement

Utilisation factor for gains,

0.81	0.74	0.63	0.48	0.34	0.23	0.16	0.18	0.31	0.53	0.73	0.83	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

407.63	420.14	398.28	336.19	257.16	169.27	112.47	117.59	185.02	283.29	357.43	398.17	(95)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

480.25	464.65	418.38	340.6	257.88	169.33	112.47	117.6	185.3	289.16	390.67	473.68	(97)
--------	--------	--------	-------	--------	--------	--------	-------	-------	--------	--------	--------	------

Space heating requirement for each month

54.02	29.91	14.95	3.18	0.54	0	0	0	0	4.37	23.94	56.18	(98a)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

54.02	29.91	14.95	3.18	0.54	0	0	0	0	4.37	23.94	56.18	(98c)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m ² /year												3.23	(99)
---	--	--	--	--	--	--	--	--	--	--	--	------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

Intermittency factor												0	(105)
----------------------	--	--	--	--	--	--	--	--	--	--	--	---	-------

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
53.54 29.64 14.82 3.15 0.53 0 0 0 0 4.33 23.72 55.68			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
92.58 91.99 91.4 90.95 90.83 90.8 90.8 90.8 90.8 91.01 91.77 92.65			(217)
Fuel for water heating			
245.78 218.79 233.88 206.29 200.05 180.09 177.48 184.6 186.71 208.02 219.72 242.84		2504.25	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		185.42	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2504.25	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	124.18 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		210.18	(231)
Electricity for lighting		144.41	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3044.26	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		6.75	(240a)
Low-rate fraction	0		6.75	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		6.75	(241a)
Low-rate fraction	0		6.75	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		6.75	(242a)

Low-rate fraction	0	6.75	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	91.15	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	34.66	(249)
Energy For lighting	0	23.81	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	248.38	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.87	(257)
SAP rating	85.93	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			38.94	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			525.89	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		564.83	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		29.16	(267)
Electricity for lighting		20.84	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		614.83	(272)
Dwelling CO ₂ Emission Rate		10.6	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			209.52	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2829.8	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3039.33	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			317.97	(281)
Electricity for lighting			221.5	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3578.79	(286)
Dwelling PE Rate			61.7	(287)

Dwelling Reference: 402
Dwelling Type: New Dwelling Design Stage
402
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	58 (1a) x 2.6	(2a) =	150.8 (3a)
Total floor area TFA			58 (4)
Dwelling volume			150.8 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	4	x 10 =	40	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.27	0.27	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.52	0.52	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.4	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47	5.24	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(24d)
Effective air change rate														
	0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(25)
Effective air change rate from PCDB:														
	0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.74	290.92	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		32.67	(31)
Party Wall	0	1069.2	(32)
Party floor		2320	(32a)
Party ceiling		1740	(32b)
Internal wall **		1069.2	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		16.99	(33)
Heat capacity $C_m = \sum (A \times k)$		6489.32	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		111.88	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		1.63	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		1.63	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		18.63	(37)
Ventilation heat loss calculated monthly			
	31.33 31.08 30.84 29.68 29.47 28.46 28.46 28.28 28.85 29.47 29.9 30.36		(38)
Heat transfer coefficient, W/K			
	49.96 49.71 49.46 48.31 48.09 47.09 47.09 46.9 47.48 48.09 48.53 48.99		(39)
Heat loss parameter (HLP), W/m ² K			
	0.86 0.86 0.85 0.83 0.83 0.81 0.81 0.81 0.82 0.83 0.84 0.84		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		1.92	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	56.49 55.64 54.4 52.04 50.29 48.34 47.23 48.46 49.81 51.9 54.32 56.27		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	24.41 24.05 23.54 22.6 21.9 21.11 20.69 21.2 21.75 22.59 23.55 24.33		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	34.34 33.09 31.84 30.59 29.34 28.1 28.1 29.34 30.59 31.84 33.09 34.34		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		106.08	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	115.24 112.78 109.79 105.23 101.53 97.55 96.02 99 102.15 106.33 110.95 114.94	1271.52	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	182.52 160.6 168.74 144.05 136.68 119.95 116.13 122.59 125.96 144.29 158.08 179.97	1759.55	(45)
Distribution loss (46) = $0.15 \times (45)$			
	27.38 24.09 25.31 21.61 20.5 17.99 17.42 18.39 18.89 21.64 23.71 27		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
229.11 202.69 215.33 189.14 183.27 165.04 162.72 169.18 171.05 190.88 203.17 226.57 2308.16		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
25.82 22.84 23.92 19.8 18.46 15.79 14.8 15.74 16.34 19.26 21.82 25.35		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
203.29 179.85 191.42 169.34 164.82 149.25 147.92 153.44 154.71 171.62 181.34 201.22 2068.22		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
97.96 87.07 93.38 83.97 82.72 75.96 75.89 78.04 77.96 85.25 88.63 97.12		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

88.14	97.58	88.14	91.07	88.14	91.07	88.14	88.14	91.07	88.14	91.07	88.14	(67)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

167.88	169.62	165.23	155.88	144.09	133	125.59	123.85	128.24	137.58	149.38	160.47	(68)
--------	--------	--------	--------	--------	-----	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.62	32.62	32.62	32.62	32.62	32.62	32.62	32.62	32.62	32.62	32.62	32.62	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	-76.98	(71)
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Water heating gains (Table 5)

131.67	129.57	125.51	116.63	111.18	105.5	102	104.89	108.27	114.58	123.1	130.53	(72)
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Total internal gains

442.55	451.63	433.74	418.45	398.27	381.44	367.6	368.74	379.45	395.17	418.43	434.01	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

56.36	110.26	181.58	264.82	324.54	332.23	316.29	271.69	211.18	130.83	70.28	46.35	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	------

Total gains – internal and solar (watts)

498.91	561.89	615.32	683.27	722.82	713.66	683.89	640.43	590.63	526	488.7	480.36	(84)
--------	--------	--------	--------	--------	--------	--------	--------	--------	-----	-------	--------	------

7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.92	0.89	0.83	0.71	0.57	0.41	0.3	0.33	0.52	0.76	0.88	0.93	(86)
------	------	------	------	------	------	-----	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.65	19.91	20.25	20.64	20.87	20.97	20.99	20.99	20.93	20.63	20.11	19.63	(87)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

20.2	20.2	20.21	20.22	20.23	20.24	20.24	20.25	20.24	20.23	20.22	20.21	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.91	0.87	0.81	0.68	0.53	0.37	0.25	0.28	0.47	0.73	0.87	0.92	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

18.63	18.95	19.37	19.85	20.1	20.22	20.24	20.24	20.18	19.85	19.22	18.61	(90)
-------	-------	-------	-------	------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.37	(91)
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Mean internal temperature (for the whole dwelling)

19.01	19.31	19.7	20.15	20.39	20.5	20.52	20.52	20.46	20.14	19.55	18.99	(92)
-------	-------	------	-------	-------	------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.01	19.31	19.7	20.15	20.39	20.5	20.52	20.52	20.46	20.14	19.55	18.99	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.9	0.86	0.8	0.68	0.54	0.38	0.27	0.3	0.49	0.72	0.85	0.9	(94)
-----	------	-----	------	------	------	------	-----	------	------	------	-----	------

Useful gains, mGm , W

446.54	481.56	490.18	465.47	389.58	271.79	183.32	191.33	287.38	379.67	415.88	433.74	(95)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

734.73	716.2	652.9	543.38	417.91	277.82	184.61	193.22	301.86	458.74	604.43	724.65	(97)
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Space heating requirement for each month

214.42	157.67	121.07	56.1	21.08	0	0	0	0	58.83	135.75	216.44	(98a)
--------	--------	--------	------	-------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

214.42	157.67	121.07	56.1	21.08	0	0	0	0	58.83	135.75	216.44	(98c)
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Space heating requirement in kWh/m²/year

16.92 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(105)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	232.3	170.83	131.17	60.78	22.84	0	0	0	0	63.74	147.08	234.5			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	84.18	83.77	83.06	81.86	80.73	79.8	79.8	79.8	79.8	81.92	83.42	84.22			(217)	
Fuel for water heating																
	241.49	214.7	230.45	206.86	204.16	187.03	185.36	192.28	193.88	209.49	217.39	238.92	2522.01		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													1063.23	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2522.01	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													147.79	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

11.04	16.75	25.88	31.35	35.83	34.2	33.8	30.89	26.14	20.12	12.56	9.42	287.98	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
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Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

3.11	6.75	13.82	21.36	28.84	29.19	28.83	24.13	17.32	9.84	4.21	2.44	189.82	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			3341.24	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		38.7	(240a)
Low-rate fraction	0		38.7	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		38.7	(241a)
Low-rate fraction	0		38.7	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		38.7	(242a)

Low-rate fraction	0	38.7	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	91.8	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	24.37	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-58.1	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	202.96	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.71	(257)
SAP rating	88.5	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			223.28	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			529.62	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		752.9	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		21.33	(268)
energy saved or generated	0	-62.07	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		724.1	(272)
Dwelling CO ₂ Emission Rate		12.48	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1201.45	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2849.88	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4051.33	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			226.69	(282)
energy saved or generated	0		-516.74	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3891.38	(286)
Dwelling PE Rate			67.09	(287)

Dwelling Reference: 403
Dwelling Type: New Dwelling Design Stage
 403
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	84 (1a) x 2.6	(2a) =	218.4 (3a)
Total floor area TFA			84 (4)
Dwelling volume			218.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	17.92		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	2.5	218.4	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													33.75	(31)													
Party Wall													0	1285.2	(32)												
Party floor													3360	(32a)													
Party ceiling													2520	(32b)													
Internal wall **													1215	(33c)													
Internal floor													0	(32d)													
Internal ceiling floor													0	(32e)													
Fabric heat loss, W/K = $\sum (A \times U)$													22.92	(33)													
Heat capacity Cm = $\sum(A \times k)$													8598.6	(34)													
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.36	(35)													
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.69	(36)													
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.69	(36a)													
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													24.6	(37)													
Ventilation heat loss calculated monthly																											
													17.53	17.32	17.11	16.06	15.85	14.81	14.81	14.6	15.23	15.85	16.27	16.69	(38)		
Heat transfer coefficient, W/K																											
													42.13	41.92	41.71	40.67	40.46	39.41	39.41	39.2	39.83	40.46	40.88	41.29	(39)		
Heat loss parameter (HLP), W/m ² K																											
													0.5	0.5	0.5	0.48	0.48	0.47	0.47	0.47	0.47	0.48	0.49	0.49	(40)		
Number of days in month (Table 1a)																											
													31	28	31	30	31	30	31	31	30	31	30	31	(41)		

4. Water heating energy requirement

Assumed occupancy, N													2.53	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	66.71	65.71	64.25	61.45	59.39	57.09	55.78	57.23	58.82	61.29	64.15	66.46		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	28.81	28.38	27.78	26.67	25.84	24.92	24.42	25.02	25.67	26.65	27.79	28.71		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	40.58	39.11	37.63	36.16	34.68	33.21	33.21	34.68	36.16	37.63	39.11	40.58		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													125.29	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	136.11	133.2	129.66	124.28	119.91	115.21	113.41	116.93	120.65	125.58	131.05	135.76	1501.75	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	215.56	189.68	199.29	170.14	161.42	141.67	137.16	144.79	148.77	170.41	186.7	212.56	2078.15	(45)
Distribution loss (46) = 0.15 x (45)														
	32.33	28.45	29.89	25.52	24.21	21.25	20.57	21.72	22.32	25.56	28	31.88		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
260.59 230.35 244.31 213.71 206.45 185.24 182.18 189.81 192.34 215.44 230.27 257.59 2608.27		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
260.59 230.35 244.31 213.71 206.45 185.24 182.18 189.81 192.34 215.44 230.27 257.59 2608.27		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
107.69 95.6 102.28 91.43 89.69 81.96 81.62 84.16 84.32 92.68 96.93 106.7		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

115.01	127.33	115.01	118.84	115.01	118.84	115.01	115.01	118.84	115.01	118.84	115.01	(67)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

227.6	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
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Water heating gains (Table 5)

144.75	142.27	137.48	126.98	120.56	113.84	109.71	113.12	117.12	124.57	134.63	143.41	(72)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Total internal gains

551.37	563.57	540.51	521.18	494.92	474.01	456	457.05	470.83	490.13	520.01	539.99	(73)
--------	--------	--------	--------	--------	--------	-----	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

102.24	200.01	329.39	480.39	588.74	602.68	573.78	492.87	383.09	237.33	127.49	84.08	(83)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	------

Total gains – internal and solar (watts)

653.62	763.58	869.9	1001.57	1083.66	1076.69	1029.78	949.92	853.93	727.45	647.5	624.07	(84)
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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, $\eta_{1,m}$ (see Table 9a)

0.86	0.77	0.65	0.48	0.35	0.23	0.17	0.19	0.32	0.56	0.77	0.87	(86)
------	------	------	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.56	20.74	20.89	20.98	21	21	21	21	21	20.96	20.79	20.53	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.52	20.52	20.52	20.54	20.54	20.55	20.55	20.55	20.54	20.54	20.53	20.53	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.84	0.76	0.64	0.47	0.33	0.22	0.15	0.17	0.3	0.54	0.76	0.86	(89)
------	------	------	------	------	------	------	------	-----	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

20	20.22	20.4	20.51	20.53	20.55	20.55	20.55	20.54	20.5	20.3	19.98	(90)
----	-------	------	-------	-------	-------	-------	-------	-------	------	------	-------	------

Living area fraction

												0.15	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

20.09	20.3	20.48	20.58	20.61	20.62	20.62	20.62	20.61	20.57	20.37	20.07	(92)
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.94	20.15	20.33	20.43	20.46	20.47	20.47	20.47	20.46	20.42	20.22	19.92	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.83	0.75	0.63	0.46	0.33	0.21	0.15	0.17	0.3	0.53	0.74	0.85	(94)
------	------	------	------	------	------	------	------	-----	------	------	------	------

Useful gains, mGm , W	542.67	570.38	547.16	462.93	353.25	231.2	152.46	159.56	253.03	387.92	481.74	527.4	(95)
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Monthly average external temperature from Table U1

	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

	658.86	639.44	576.7	468.98	354.21	231.28	152.47	159.58	253.44	397.28	536.36	649.07	(97)
--	--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

	86.45	46.41	21.97	4.36	0.71	0	0	0	0	6.97	39.32	90.52	(98a)
--	-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

	0	0	0	0	0	0	0	0	0	0	0	0	(98b)
--	---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

	86.45	46.41	21.97	4.36	0.71	0	0	0	0	6.97	39.32	90.52	(98c)
--	-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m ² /year												3.53	(99)
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8c. Space Cooling requirement

Heat loss rate,

	0	0	0	0	0	0	0	0	0	0	0	0	(100)
--	---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

	0	0	0	0	0	0	0	0	0	0	0	0	(101)
--	---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

	0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

	0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)

	0	0	0	0	0	0	0	0	0	0	0	0	(104)
--	---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
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Intermittency factor

	0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

	0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
85.67 45.99 21.78 4.32 0.71 0 0 0 0 6.91 38.97 89.71			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
93.12 92.35 91.56 90.98 90.83 90.8 90.8 90.8 90.8 91.09 92.15 93.23			(217)
Fuel for water heating			
279.84 249.43 266.85 234.89 227.29 204.01 200.64 209.04 211.83 236.52 249.9 276.3		2846.53	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		294.06	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2846.53	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	179.85 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		265.85	(231)
Electricity for lighting		192.86	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3599.3	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		10.7 (240a)
Low-rate fraction	0		10.7 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		10.7 (241a)
Low-rate fraction	0		10.7 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		10.7 (242a)

Low-rate fraction	0	10.7	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.61	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	43.84	(249)
Energy For lighting	0	31.8	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	281.96	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.79	(257)
SAP rating	87.24	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			61.75	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			597.77	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		659.52	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		36.88	(267)
Electricity for lighting		27.84	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		724.24	(272)
Dwelling CO ₂ Emission Rate		8.62	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			332.29	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3216.58	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3548.87	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			402.18	(281)
Electricity for lighting			295.81	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4246.86	(286)
Dwelling PE Rate			50.56	(287)

Dwelling Reference: 403
Dwelling Type: New Dwelling Design Stage
403
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	84 (1a) x 2.6	(2a) =	218.4 (3a)
Total floor area TFA			84 (4)
Dwelling volume			218.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	3	x 10 =	30	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.14	0.14	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.39	0.39	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.3	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.38	0.38	0.37	0.33	0.32	0.29	0.29	0.28	0.3	0.32	0.34	0.35	3.94	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
Effective air change rate														
	0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
Effective air change rate from PCDB:														
	0.57	0.57	0.57	0.55	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	17.92		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	2.81	218.4	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													33.75	(31)												
Party Wall													0	1285.2	(32)											
Party floor													3360	(32a)												
Party ceiling													2520	(32b)												
Internal wall **													1215	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\sum (A \times U)$													23.23	(33)												
Heat capacity Cm = $\sum(A \times k)$													8598.6	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.36	(35)												
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.69	(36)												
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.69	(36a)												
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													24.92	(37)												
Ventilation heat loss calculated monthly																										
													41.32	41.11	40.91	39.97	39.79	38.97	38.97	38.81	39.28	39.79	40.15	40.52	(38)	
Heat transfer coefficient, W/K																										
													66.23	66.03	65.82	64.88	64.7	63.88	63.88	63.73	64.2	64.7	65.06	65.44	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.79	0.79	0.78	0.77	0.77	0.76	0.76	0.76	0.76	0.77	0.77	0.78	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.53	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	66.71	65.71	64.25	61.45	59.39	57.09	55.78	57.23	58.82	61.29	64.15	66.46		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	28.81	28.38	27.78	26.67	25.84	24.92	24.42	25.02	25.67	26.65	27.79	28.71		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	40.58	39.11	37.63	36.16	34.68	33.21	33.21	34.68	36.16	37.63	39.11	40.58		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													125.29	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	136.11	133.2	129.66	124.28	119.91	115.21	113.41	116.93	120.65	125.58	131.05	135.76	1501.75	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	215.56	189.68	199.29	170.14	161.42	141.67	137.16	144.79	148.77	170.41	186.7	212.56	2078.15	(45)
Distribution loss (46) = 0.15 x (45)														
	32.33	28.45	29.89	25.52	24.21	21.25	20.57	21.72	22.32	25.56	28	31.88		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m [(47) - Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
262.16 231.77 245.88 215.23 208.02 186.76 183.75 191.38 193.86 217.01 231.79 259.16 2626.76		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
30.5 26.97 28.24 23.39 21.8 18.65 17.48 18.59 19.3 22.75 25.77 29.93		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
231.66 204.79 217.64 191.84 186.22 168.11 166.27 172.79 174.57 194.26 206.02 229.22 2343.39		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
108.95 96.74 103.54 92.64 90.95 83.18 82.88 85.42 85.54 93.94 98.15 107.95		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

116.64	129.13	116.64	120.52	116.64	120.52	116.64	116.64	120.52	116.64	120.52	116.64	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

227.6	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
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Water heating gains (Table 5)

146.44	143.95	139.17	128.67	122.24	115.52	111.4	114.81	118.81	126.26	136.32	145.1	(72)
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Total internal gains

554.69	567.06	543.82	524.55	498.24	477.38	459.32	460.37	474.2	493.44	523.38	543.3	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

93.94	183.76	302.63	441.36	540.9	553.71	527.16	452.82	351.97	218.05	117.13	77.25	(83)
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Total gains – internal and solar (watts)

648.62	750.82	846.45	965.91	1039.14	1031.09	986.48	913.19	826.17	711.49	640.51	620.55	(84)
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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C)	21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.93	0.89	0.82	0.69	0.54	0.39	0.28	0.32	0.51	0.75	0.89	0.93	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.62	19.91	20.28	20.67	20.88	20.97	20.99	20.99	20.93	20.62	20.08	19.57	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.26	20.27	20.27	20.28	20.28	20.29	20.29	20.29	20.28	20.28	20.28	20.27	(88)
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Roof Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.92	0.87	0.8	0.66	0.5	0.35	0.24	0.27	0.46	0.72	0.87	0.93	(89)
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Roof Mean internal temperature in the rest of dwelling T2

18.64	19.01	19.46	19.93	20.17	20.27	20.28	20.28	20.23	19.89	19.22	18.59	(90)
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Living area fraction

0.15	(91)
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Mean internal temperature (for the whole dwelling)

18.79	19.15	19.59	20.04	20.28	20.38	20.39	20.39	20.33	20	19.36	18.75	(92)
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Adjusted mean internal temperature:

18.79	19.15	19.59	20.04	20.28	20.38	20.39	20.39	20.33	20	19.36	18.75	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.9	0.85	0.78	0.65	0.5	0.35	0.24	0.28	0.46	0.71	0.85	0.91	(94)
-----	------	------	------	-----	------	------	------	------	------	------	------	------

Useful gains, mGm , W

581.26	639.37	660.65	630.82	523.66	362.32	240.96	252.31	383.01	506.3	545.4	562.04	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

959.95	940.67	861.54	723.1	555.11	368.93	242.32	254.41	400.25	608.28	797.41	951.78	(97)
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Space heating requirement for each month

281.75	202.48	149.46	66.44	23.39	0	0	0	0	75.88	181.44	289.96	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

281.75	202.48	149.46	66.44	23.39	0	0	0	0	75.88	181.44	289.96	(98c)
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Space heating requirement in kWh/m ² /year												15.13	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		92.3	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
305.25 219.37 161.93 71.98 25.34 0 0 0 0 82.21 196.58 314.15			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	79.8	(216)
Efficiency of water heater			
84.5 84.03 83.23 81.94 80.71 79.8 79.8 79.8 79.8 82.14 83.78 84.59			(217)
Fuel for water heating			
274.16 243.7 261.48 234.13 230.72 210.66 208.36 216.53 218.75 236.5 245.91 270.99		2851.89	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		1376.82	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2851.89	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	(230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		86	(231)
Electricity for lighting		195.59	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

15.81	23.87	36.72	44.27	50.4	48.02	47.43	43.44	36.9	28.57	17.93	13.49	406.85	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

4.69	10.16	20.77	32.05	43.25	43.78	43.28	36.25	26.05	14.82	6.35	3.69	285.14	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			3818.31	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		50.12	(240a)
Low-rate fraction	0		50.12	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		50.12	(241a)
Low-rate fraction	0		50.12	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		50.12	(242a)

Low-rate fraction	0	50.12	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.81	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	32.25	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-83.04	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	209.32	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.58	(257)
SAP rating	90.53	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			289.13	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			598.9	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		888.03	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		28.23	(268)
energy saved or generated	0	-89.86	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		838.33	(272)
Dwelling CO ₂ Emission Rate		9.98	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			1555.81	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3222.64	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4778.44	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			300	(282)
energy saved or generated	0		-737.99	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4470.55	(286)
Dwelling PE Rate			53.22	(287)

Dwelling Reference: 404
Dwelling Type: New Dwelling Design Stage
404
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	52 (1a) x 2.6	(2a) =	135.2 (3a)
Total floor area TFA			52 (4)
Dwelling volume			135.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	1.47	128.38	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													21.06	(31)
Party Wall								0					1458	(32)
Party floor													2080	(32a)
Party ceiling													1560	(32b)
Internal wall **													972	(33c)
Internal floor													0	(32d)
Internal ceiling floor													0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$													14.72	(33)
Heat capacity Cm = $\sum(A \times k)$													6198.38	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													119.2	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.05	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.05	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													15.77	(37)
Ventilation heat loss calculated monthly														
	10.85	10.72	10.59	9.94	9.81	9.17	9.17	9.04	9.43	9.81	10.07	10.33		(38)
Heat transfer coefficient, W/K														
	26.62	26.49	26.36	25.72	25.59	24.94	24.94	24.81	25.2	25.59	25.85	26.1		(39)
Heat loss parameter (HLP), W/m ² K														
	0.51	0.51	0.51	0.49	0.49	0.48	0.48	0.48	0.48	0.49	0.5	0.5		(40)
Number of days in month (Table 1a)														
	31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N													1.75	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	53.55	52.74	51.57	49.32	47.67	45.82	44.77	45.94	47.21	49.2	51.49	53.34		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	23.15	22.81	22.32	21.43	20.76	20.02	19.62	20.1	20.62	21.42	22.33	23.07		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	32.54	31.36	30.18	28.99	27.81	26.63	26.63	27.81	28.99	30.18	31.36	32.54		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													100.56	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	109.24	106.91	104.07	99.75	96.24	92.47	91.02	93.85	96.83	100.79	105.17	108.95	1205.27	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	173.01	152.23	159.94	136.55	129.56	113.7	110.08	116.2	119.4	136.77	149.84	170.6	1667.86	(45)
Distribution loss (46) = 0.15 x (45)														
	25.95	22.83	23.99	20.48	19.43	17.05	16.51	17.43	17.91	20.52	22.48	25.59		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
218.03 192.9 204.97 180.12 174.58 157.27 155.1 161.22 162.97 181.79 193.41 215.62 2197.99		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
218.03 192.9 204.97 180.12 174.58 157.27 155.1 161.22 162.97 181.79 193.41 215.62 2197.99		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
93.54 83.15 89.2 80.26 79.1 72.66 72.62 74.66 74.56 81.49 84.68 92.74		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

77.2	85.47	77.2	79.77	77.2	79.77	77.2	77.2	79.77	77.2	79.77	77.2	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

152.43	154.01	150.02	141.54	130.83	120.76	114.03	112.45	116.44	124.92	135.63	145.7	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	(71)
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Water heating gains (Table 5)

125.73	123.74	119.89	111.47	106.31	100.92	97.61	100.34	103.55	109.54	117.61	124.65	(72)
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Total internal gains

407.59	415.45	399.35	385.01	366.57	350.68	338.07	339.23	348.99	363.89	385.25	399.79	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

61.35	120.01	197.63	288.24	353.24	361.61	344.27	295.72	229.86	142.4	76.49	50.45	(83)
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Total gains – internal and solar (watts)

468.93	535.45	596.98	673.25	719.81	712.29	682.34	634.95	578.85	506.29	461.74	450.23	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.82	0.73	0.62	0.46	0.33	0.22	0.16	0.18	0.3	0.52	0.72	0.83	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.73	20.85	20.94	20.99	21	21	21	21	21	20.98	20.89	20.72	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.51	20.51	20.51	20.53	20.53	20.54	20.54	20.54	20.54	20.53	20.52	20.52	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.8	0.72	0.6	0.44	0.31	0.21	0.14	0.16	0.28	0.5	0.7	0.82	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

20.2	20.35	20.45	20.51	20.53	20.54	20.54	20.54	20.53	20.51	20.4	20.2	(90)
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Living area fraction

												0.24	(91)
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Mean internal temperature (for the whole dwelling)

20.33	20.47	20.57	20.63	20.64	20.65	20.65	20.65	20.64	20.62	20.52	20.32	(92)
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Adjusted mean internal temperature:

20.18	20.32	20.42	20.48	20.49	20.5	20.5	20.5	20.49	20.47	20.37	20.17	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.79	0.71	0.6	0.44	0.31	0.21	0.14	0.16	0.28	0.49	0.7	0.81	(94)
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Useful gains, mGm , W

372.78	380.54	355.97	295.78	224.6	147.08	97.22	101.72	161.03	249.8	322.38	364.46	(95)
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Monthly average external temperature from Table U1

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

422.77	408.42	366.9	297.71	224.86	147.09	97.22	101.72	161.12	252.62	342.87	416.9	(97)
--------	--------	-------	--------	--------	--------	-------	--------	--------	--------	--------	-------	------

Space heating requirement for each month

37.2	18.74	8.13	1.39	0.19	0	0	0	0	2.1	14.75	39.01	(98a)
------	-------	------	------	------	---	---	---	---	-----	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

37.2	18.74	8.13	1.39	0.19	0	0	0	0	2.1	14.75	39.01	(98c)
------	-------	------	------	------	---	---	---	---	-----	-------	-------	-------

Space heating requirement in kWh/m²/year

2.34 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0 (105)
--	--	--	--	--	--	--	--	--	--	--	--	---------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0	0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
36.87 18.57 8.06 1.38 0.19 0 0 0 0 2.08 14.62 38.67			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
92.14 91.61 91.15 90.87 90.81 90.8 90.8 90.8 90.8 90.9 91.45 92.21			(217)
Fuel for water heating			
236.62 210.56 224.87 198.22 192.25 173.21 170.82 177.56 179.48 199.98 211.5 233.83		2408.89	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		120.44	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2408.89	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	111.34 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		197.34	(231)
Electricity for lighting		129.45	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	2856.11	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		4.38	(240a)
Low-rate fraction	0		4.38	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		4.38	(241a)
Low-rate fraction	0		4.38	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		4.38	(242a)

Low-rate fraction	0	4.38	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	87.68	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	32.54	(249)
Energy For lighting	0	21.35	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	237.95	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.88	(257)
SAP rating	85.68	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			25.29	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			505.87	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		531.16	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		27.37	(267)
Electricity for lighting		18.68	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		577.22	(272)
Dwelling CO ₂ Emission Rate		11.1	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			136.09	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2722.05	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			2858.14	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			298.53	(281)
Electricity for lighting			198.55	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3355.22	(286)
Dwelling PE Rate			64.52	(287)

Dwelling Reference: 404
 Dwelling Type: New Dwelling Design Stage
 404
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	52 (1a) x 2.6	(2a) =	135.2 (3a)
Total floor area TFA			52 (4)
Dwelling volume			135.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.4	0.4	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.31	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.39	0.39	0.38	0.34	0.33	0.29	0.29	0.29	0.31	0.33	0.35	0.36	4.05	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.57		(24d)
Effective air change rate														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.57		(25)
Effective air change rate from PCDB:														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.57		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	1.65	128.38	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		21.06	(31)
Party Wall	0	1458	(32)
Party floor		2080	(32a)
Party ceiling		1560	(32b)
Internal wall **		972	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		14.9	(33)
Heat capacity $C_m = \sum (A \times k)$		6198.38	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		119.2	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		1.05	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		1.05	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		15.96	(37)
Ventilation heat loss calculated monthly			
	25.76 25.62 25.49 24.88 24.76 24.22 24.22 24.12 24.43 24.76 24.99 25.24		(38)
Heat transfer coefficient, W/K			
	41.71 41.58 41.45 40.83 40.72 40.18 40.18 40.08 40.39 40.72 40.95 41.19		(39)
Heat loss parameter (HLP), W/m ² K			
	0.8 0.8 0.8 0.79 0.78 0.77 0.77 0.77 0.78 0.78 0.79 0.79		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		1.75	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	53.55 52.74 51.57 49.32 47.67 45.82 44.77 45.94 47.21 49.2 51.49 53.34		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	23.15 22.81 22.32 21.43 20.76 20.02 19.62 20.1 20.62 21.42 22.33 23.07		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	32.54 31.36 30.18 28.99 27.81 26.63 26.63 27.81 28.99 30.18 31.36 32.54		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		100.56	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	109.24 106.91 104.07 99.75 96.24 92.47 91.02 93.85 96.83 100.79 105.17 108.95	1205.27	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	173.01 152.23 159.94 136.55 129.56 113.7 110.08 116.2 119.4 136.77 149.84 170.6	1667.86	(45)
Distribution loss (46) = $0.15 \times (45)$			
	25.95 22.83 23.99 20.48 19.43 17.05 16.51 17.43 17.91 20.52 22.48 25.59		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
219.6 194.32 206.54 181.64 176.15 158.79 156.67 162.8 164.49 183.36 194.93 217.19 2216.48		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
24.48 21.65 22.67 18.77 17.49 14.97 14.03 14.92 15.49 18.26 20.69 24.03		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
195.12 172.67 183.87 162.87 158.66 143.82 142.64 147.87 149 165.1 174.24 193.17 1989.03		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
94.8 84.29 90.46 81.48 80.35 73.88 73.88 75.91 75.77 82.75 85.89 94		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

78.48	86.89	78.48	81.1	78.48	81.1	78.48	78.48	81.1	78.48	81.1	78.48	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

152.43	154.01	150.02	141.54	130.83	120.76	114.03	112.45	116.44	124.92	135.63	145.7	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	(71)
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Water heating gains (Table 5)

127.42	125.43	121.58	113.16	108	102.61	99.3	102.03	105.24	111.22	119.3	126.34	(72)
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Total internal gains

410.57	418.56	402.32	388.03	369.55	353.7	341.05	342.2	352.01	366.87	388.27	402.76	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

56.36	110.26	181.58	264.82	324.54	332.23	316.29	271.69	211.18	130.83	70.28	46.35	(83)
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Total gains – internal and solar (watts)

466.93	528.82	583.9	652.85	694.09	685.93	657.34	613.9	563.19	497.69	458.54	449.11	(84)
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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, $\eta_{1,m}$ (see Table 9a)

0.91	0.87	0.8	0.67	0.52	0.37	0.27	0.3	0.48	0.72	0.87	0.92	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.94	20.18	20.48	20.78	20.93	20.99	21	21	20.96	20.75	20.32	19.9	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.25	20.25	20.26	20.27	20.27	20.28	20.28	20.28	20.27	20.27	20.26	20.26	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.9	0.86	0.78	0.64	0.48	0.33	0.22	0.25	0.43	0.69	0.85	0.91	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

19.02	19.32	19.68	20.04	20.2	20.27	20.28	20.28	20.24	20.02	19.51	18.98	(90)
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Living area fraction

0.24 (91)

Mean internal temperature (for the whole dwelling)

19.24	19.52	19.87	20.21	20.37	20.44	20.45	20.45	20.41	20.19	19.7	19.2	(92)
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Adjusted mean internal temperature:

19.24	19.52	19.87	20.21	20.37	20.44	20.45	20.45	20.41	20.19	19.7	19.2	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.89 0.84 0.77 0.64 0.49 0.34 0.23 0.26 0.44 0.69 0.84 0.9 (94)

Useful gains, mGm, W

413.78 444.82 449.05 417.28 339.49 232.01 154.08 161.46 248.13 342.14 383.22 402.28 (95)

Monthly average external temperature from Table U1

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

623 607.9 553.98 461.83 353.16 234.48 154.52 162.16 254.92 390.43 515.92 617.85 (97)

Space heating requirement for each month

155.66 109.58 78.07 32.08 10.17 0 0 0 0 35.93 95.55 160.38 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

155.66 109.58 78.07 32.08 10.17 0 0 0 0 35.93 95.55 160.38 (98c)

Space heating requirement in kWh/m²/year

13.03 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													92.3	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	168.65	118.73	84.58	34.75	11.01	0	0	0	0	38.92	103.52	173.76		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												79.8	(216)	
Efficiency of water heater															
	83.56	83.07	82.29	81.15	80.29	79.8	79.8	79.8	79.8	81.27	82.77	83.65		(217)	
Fuel for water heating															
	233.52	207.86	223.45	200.69	197.6	180.23	178.75	185.31	186.72	203.15	210.51	230.93	2438.72	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													733.92	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													2438.72	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													41	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													86	(231)	
Electricity for lighting													131.61	(232)	



Low-rate fraction	0	26.71	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	88.77	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	21.7	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-52.26	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	191.11	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.71	(257)
SAP rating	88.5	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			154.12	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			512.13	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		666.26	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		19	(268)
energy saved or generated	0	-55.65	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		641.53	(272)
Dwelling CO ₂ Emission Rate		12.34	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			829.33	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2755.76	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3585.09	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			201.87	(282)
energy saved or generated	0		-464.74	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3452.31	(286)
Dwelling PE Rate			66.39	(287)

Dwelling Reference: 405
Dwelling Type: New Dwelling Design Stage
405
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	61 (1a) x 2.6	(2a) =	158.6 (3a)
Total floor area TFA			61 (4)
Dwelling volume			158.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	5.06	442.68	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²													46.44	(31)	
Party Wall													0	1085.4	(32)
Party floor													2440	(32a)	
Party ceiling													1830	(32b)	
Internal wall **													1069.2	(33c)	
Internal floor													0	(32d)	
Internal ceiling floor													0	(32e)	
Fabric heat loss, W/K = $\Sigma (A \times U)$													21.7	(33)	
Heat capacity Cm = $\Sigma(A \times k)$													6867.28	(34)	
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													112.58	(35)	
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K													2.32	(36)	
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available													2.32	(36a)	
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$													24.02	(37)	
Ventilation heat loss calculated monthly															
12.73 12.58 12.43 11.66 11.51 10.75 10.75 10.6 11.06 11.51 11.82 12.12														(38)	
Heat transfer coefficient, W/K															
36.75 36.59 36.44 35.68 35.53 34.77 34.77 34.62 35.07 35.53 35.83 36.14														(39)	
Heat loss parameter (HLP), W/m ² K															
0.6 0.6 0.6 0.58 0.58 0.57 0.57 0.57 0.57 0.58 0.59 0.59														(40)	
Number of days in month (Table 1a)															
31 28 31 30 31 30 31 31 30 31 30 31														(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.01	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.92	57.05	55.78	53.35	51.56	49.56	48.43	49.69	51.07	53.21	55.69	57.69		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	25.03	24.66	24.13	23.17	22.45	21.64	21.21	21.73	22.3	23.16	24.14	24.94		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	35.21	33.93	32.65	31.37	30.09	28.81	28.81	30.09	31.37	32.65	33.93	35.21		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													108.77	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	118.16	115.64	112.56	107.89	104.1	100.02	98.45	101.51	104.74	109.02	113.76	117.85	1303.69	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	187.13	164.66	173.01	147.7	140.13	122.98	119.07	125.69	129.15	147.94	162.07	184.53	1804.06	(45)
Distribution loss (46) = 0.15 x (45)														
	28.07	24.7	25.95	22.15	21.02	18.45	17.86	18.85	19.37	22.19	24.31	27.68		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
232.16 205.33 218.03 191.27 185.16 166.56 164.09 170.71 172.72 192.96 205.65 229.55 2334.19		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
232.16 205.33 218.03 191.27 185.16 166.56 164.09 170.71 172.72 192.96 205.65 229.55 2334.19		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
98.24 87.28 93.54 83.97 82.61 75.75 75.61 77.81 77.8 85.21 88.75 97.37		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

88.5	97.98	88.5	91.45	88.5	91.45	88.5	88.5	91.45	88.5	91.45	88.5	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

175.46	177.28	172.69	162.93	150.6	139.01	131.27	129.45	134.03	143.8	156.13	167.72	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	(71)
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Water heating gains (Table 5)

132.04	129.89	125.73	116.62	111.04	105.21	101.63	104.58	108.06	114.53	123.26	130.88	(72)
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Total internal gains

452.15	461.3	443.07	427.14	406.28	388.81	374.54	375.68	386.69	402.98	426.99	443.25	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

81.79	160.01	263.51	384.31	470.99	482.14	459.02	394.29	306.47	189.86	101.99	67.26	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	------

Total gains – internal and solar (watts)

533.95	621.31	706.58	811.46	877.28	870.96	833.56	769.97	693.16	592.84	528.98	510.51	(84)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.87	0.8	0.68	0.52	0.37	0.26	0.18	0.21	0.35	0.59	0.79	0.88	(86)
------	-----	------	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.43	20.64	20.83	20.96	20.99	21	21	21	21	20.93	20.7	20.41	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.43	20.43	20.43	20.44	20.45	20.46	20.46	20.46	20.45	20.45	20.44	20.44	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.86	0.78	0.66	0.5	0.35	0.23	0.16	0.18	0.32	0.57	0.78	0.87	(89)
------	------	------	-----	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

19.77	20.02	20.24	20.4	20.44	20.46	20.46	20.46	20.45	20.38	20.11	19.75	(90)
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Living area fraction

												0.2	(91)
--	--	--	--	--	--	--	--	--	--	--	--	-----	------

Mean internal temperature (for the whole dwelling)

19.91	20.15	20.36	20.51	20.55	20.57	20.57	20.57	20.56	20.49	20.23	19.88	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.76	20	20.21	20.36	20.4	20.42	20.42	20.42	20.41	20.34	20.08	19.73	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.84	0.77	0.66	0.49	0.35	0.23	0.16	0.18	0.32	0.56	0.76	0.86	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm, W

449.15	476.15	463.4	399.83	307.38	202.03	132.67	139.06	220.51	333.23	403.86	436.63	(95)
--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

567.98	552.45	499.71	408.92	309.07	202.21	132.69	139.1	221.28	346.12	465.18	561.18	(97)
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Space heating requirement for each month

88.41	51.28	27.02	6.54	1.26	0	0	0	0	9.59	44.15	92.66	(98a)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

88.41	51.28	27.02	6.54	1.26	0	0	0	0	9.59	44.15	92.66	(98c)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m ² /year												5.26	(99)
---	--	--	--	--	--	--	--	--	--	--	--	------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)												(104)
---	--	--	--	--	--	--	--	--	--	--	--	-------

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction												0	(105)
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Intermittency factor													(106)
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0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month								0				0	(107)
-------------------------------------	--	--	--	--	--	--	--	---	--	--	--	---	-------

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,								0				0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
87.62 50.82 26.77 6.49 1.25 0 0 0 0 9.51 43.76 91.84			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
93.38 92.65 91.81 91.1 90.86 90.8 90.8 90.8 90.8 91.23 92.44 93.49			(217)
Fuel for water heating			
248.62 221.61 237.47 209.95 203.78 183.43 180.72 188.01 190.22 211.5 222.48 245.53		2543.33	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		318.05	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2543.33	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	130.61 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		216.61	(231)
Electricity for lighting		148.41	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3226.39	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		11.58 (240a)
Low-rate fraction	0		11.58 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		11.58 (241a)
Low-rate fraction	0		11.58 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		11.58 (242a)

Low-rate fraction	0	11.58	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	92.58	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	35.72	(249)
Energy For lighting	0	24.47	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	256.35	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.87	(257)
SAP rating	85.89	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			66.79	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			534.1	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		600.89	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		30.05	(267)
Electricity for lighting		21.42	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		652.36	(272)
Dwelling CO ₂ Emission Rate		10.69	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			359.4	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2873.96	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3233.36	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			327.68	(281)
Electricity for lighting			227.63	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3788.67	(286)
Dwelling PE Rate			62.11	(287)

Dwelling Reference: 405
Dwelling Type: New Dwelling Design Stage
405
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	61 (1a) x 2.6	(2a) =	158.6 (3a)
Total floor area TFA			61 (4)
Dwelling volume			158.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.13	0.13	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.38	0.38	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.29	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34	3.83	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(24d)
Effective air change rate														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)
Effective air change rate from PCDB:														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	5.69	442.68	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²														46.44	(31)
Party Wall								0						1085.4	(32)
Party floor														2440	(32a)
Party ceiling														1830	(32b)
Internal wall **														1069.2	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$														22.33	(33)
Heat capacity Cm = $\sum(A \times k)$														6867.28	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K														112.58	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K														2.32	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available														2.32	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$														24.65	(37)
Ventilation heat loss calculated monthly															
	29.78	29.64	29.51	28.86	28.74	28.18	28.18	28.07	28.39	28.74	28.98	29.24			(38)
Heat transfer coefficient, W/K															
	54.43	54.29	54.15	53.51	53.39	52.83	52.83	52.72	53.04	53.39	53.63	53.89			(39)
Heat loss parameter (HLP), W/m²K															
	0.89	0.89	0.89	0.88	0.88	0.87	0.87	0.86	0.87	0.88	0.88	0.88			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N													2.01	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.92	57.05	55.78	53.35	51.56	49.56	48.43	49.69	51.07	53.21	55.69	57.69		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	25.03	24.66	24.13	23.17	22.45	21.64	21.21	21.73	22.3	23.16	24.14	24.94		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	35.21	33.93	32.65	31.37	30.09	28.81	28.81	30.09	31.37	32.65	33.93	35.21		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													108.77	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	118.16	115.64	112.56	107.89	104.1	100.02	98.45	101.51	104.74	109.02	113.76	117.85	1303.69	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	187.13	164.66	173.01	147.7	140.13	122.98	119.07	125.69	129.15	147.94	162.07	184.53	1804.06	(45)
Distribution loss (46) = 0.15 x (45)														
	28.07	24.7	25.95	22.15	21.02	18.45	17.86	18.85	19.37	22.19	24.31	27.68		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
233.73 206.75 219.6 192.79 186.73 168.08 165.66 172.28 174.24 194.53 207.17 231.12 2352.68		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
26.48 23.42 24.52 20.3 18.92 16.19 15.18 16.14 16.75 19.75 22.37 25.99		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
207.25 183.33 195.08 172.49 167.81 151.88 150.48 156.14 157.49 174.78 184.79 205.14 2106.66		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
99.5 88.42 94.8 85.18 83.87 76.97 76.87 79.07 79.02 86.46 89.96 98.63		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

88.9 98.43 88.9 91.87 88.9 91.87 88.9 88.9 91.87 88.9 91.87 88.9 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

175.46 177.28 172.69 162.93 150.6 139.01 131.27 129.45 134.03 143.8 156.13 167.72 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

33.05 33.05 33.05 33.05 33.05 33.05 33.05 33.05 33.05 33.05 33.05 33.05 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 -80.39 (71)

Water heating gains (Table 5)

133.73 131.58 127.42 118.31 112.73 106.9 103.31 106.27 109.74 116.22 124.95 132.57 (72)

Total internal gains

454.24 463.43 445.16 429.25 408.38 390.92 376.63 377.77 388.79 405.07 429.09 445.34 (73)

6. Solar gains

Solar gains in watts, calculated for each month

75.15 147.01 242.1 353.09 432.72 442.97 421.73 362.26 281.57 174.44 93.7 61.8 (83)

Total gains – internal and solar (watts)

529.39 610.44 687.26 782.34 841.1 833.89 798.35 740.02 670.36 579.5 522.8 507.14 (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, $\eta_{1,m}$ (see Table 9a)

0.92 0.88 0.82 0.69 0.55 0.39 0.29 0.32 0.51 0.76 0.89 0.93 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.58 19.87 20.24 20.64 20.87 20.97 20.99 20.99 20.92 20.6 20.04 19.53 (87)

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

20.17 20.18 20.18 20.19 20.19 20.2 20.2 20.2 20.19 20.19 20.19 20.18 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.91 0.87 0.8 0.66 0.51 0.35 0.24 0.27 0.46 0.72 0.87 0.92 (89)

Roof

Mean internal temperature in the rest of dwelling T2

18.52 18.88 19.34 19.82 20.07 20.17 20.19 20.19 20.13 19.78 19.1 18.47 (90)

Living area fraction

0.2 (91)

Mean internal temperature (for the whole dwelling)

18.73 19.08 19.52 19.98 20.23 20.33 20.35 20.35 20.29 19.94 19.29 18.68 (92)

Adjusted mean internal temperature:

18.73 19.08 19.52 19.98 20.23 20.33 20.35 20.35 20.29 19.94 19.29 18.68 (93)

8. Space heating requirement

Utilisation factor for gains,

0.89	0.85	0.78	0.66	0.51	0.36	0.25	0.28	0.47	0.71	0.85	0.9	(94)
------	------	------	------	------	------	------	------	------	------	------	-----	------

Useful gains, mGm , W

472.95	518.76	535.97	512.89	427.25	296.62	196.96	206.33	312.8	411.99	443.8	457.88	(95)
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Monthly average external temperature from Table U1

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

785.68	769.86	705.23	593.04	455.37	302.81	198.25	208.31	328.28	498.87	653.94	780.33	(97)
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Space heating requirement for each month

232.67	168.74	125.93	57.71	20.93	0	0	0	0	64.64	151.3	239.91	(98a)
--------	--------	--------	-------	-------	---	---	---	---	-------	-------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

232.67	168.74	125.93	57.71	20.93	0	0	0	0	64.64	151.3	239.91	(98c)
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Space heating requirement in kWh/m ² /year												17.41	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)		
Space heating fuel (main heating system 1), kWh/month	0												0			
	252.08	182.81	136.44	62.52	22.67	0	0	0	0	70.03	163.92	259.92		(211)		
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(213)		
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(215)		
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	84.32	83.87	83.1	81.88	80.71	79.8	79.8	79.8	79.8	82.04	83.62	84.41		(217)		
Fuel for water heating																
	245.79	218.58	234.74	210.65	207.92	190.33	188.58	195.67	197.35	213.03	221	243.02	2566.67	(219)		
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0		(221)		
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													1150.41	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2566.67	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													149.08	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

11.6	17.58	27.14	32.86	37.55	35.83	35.4	32.37	27.4	21.1	13.18	9.89	301.91	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

3.29	7.14	14.6	22.57	30.46	30.83	30.46	25.5	18.31	10.4	4.45	2.58	200.61	(233b)
------	------	------	-------	-------	-------	-------	------	-------	------	------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			3449.64	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.87	(240a)
Low-rate fraction	0		41.87	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.87	(241a)
Low-rate fraction	0		41.87	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.87	(242a)

Low-rate fraction	0	41.87	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	93.43	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	24.58	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-61.01	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	205.06	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.7	(257)
SAP rating	88.71	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			241.59	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			539	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		780.59	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		21.52	(268)
energy saved or generated	0	-65.27	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		748.76	(272)
Dwelling CO ₂ Emission Rate		12.27	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1299.96	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2900.34	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4200.3	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			228.67	(282)
energy saved or generated	0		-542.48	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4016.58	(286)
Dwelling PE Rate			65.85	(287)

Dwelling Reference: 406
Dwelling Type: New Dwelling Design Stage
 406
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	4.65	407.12	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²												40.77	(31)												
Party Wall												0	1198.8	(32)											
Party floor												2000	(32a)												
Party ceiling												1500	(32b)												
Internal wall **												729	(33c)												
Internal floor												0	(32d)												
Internal ceiling floor												0	(32e)												
Fabric heat loss, W/K = $\Sigma (A \times U)$												17.7	(33)												
Heat capacity Cm = $\Sigma(A \times k)$												5834.92	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K												116.7	(35)												
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K												2.04	(36)												
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available												2.04	(36a)												
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$												19.74	(37)												
Ventilation heat loss calculated monthly																									
												10.43	10.31	10.18	9.56	9.44	8.81	8.81	8.69	9.06	9.44	9.69	9.94	(38)	
Heat transfer coefficient, W/K																									
												30.18	30.05	29.93	29.3	29.18	28.56	28.56	28.43	28.81	29.18	29.43	29.68	(39)	
Heat loss parameter (HLP), W/m ² K																									
												0.6	0.6	0.6	0.59	0.58	0.57	0.57	0.57	0.58	0.58	0.59	0.59	(40)	
Number of days in month (Table 1a)																									
												31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
92.48 82.22 88.22 79.42 78.3 71.96 71.94 73.94 73.82 80.65 83.76 91.69		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.37 82.33 74.37 76.85 74.37 76.85 74.37 74.37 76.85 74.37 76.85 74.37 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23 148.76 144.91 136.72 126.37 116.64 110.15 108.62 112.47 120.67 131.01 140.74 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 (71)

Water heating gains (Table 5)

124.3 122.35 118.57 110.31 105.24 99.95 96.7 99.39 102.53 108.41 116.33 123.25 (72)

Total internal gains

397.25 404.79 389.2 375.22 357.33 341.79 329.57 330.72 340.2 354.79 375.54 389.7 (73)

6. Solar gains

Solar gains in watts, calculated for each month

89.57 159.72 233.3 306.93 355.1 356.17 341.97 306.36 259.32 180.92 108.69 75.69 (83)

Total gains – internal and solar (watts)

486.83 564.52 622.51 682.15 712.43 697.96 671.53 637.08 599.52 535.71 484.23 465.39 (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, $\eta_{1,m}$ (see Table 9a)

0.83 0.75 0.65 0.51 0.38 0.26 0.19 0.21 0.33 0.55 0.75 0.85 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.56 20.74 20.87 20.96 20.99 21 21 21 21 20.96 20.79 20.54 (87)

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

20.43 20.43 20.43 20.44 20.44 20.46 20.46 20.46 20.45 20.44 20.44 20.44 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.82 0.74 0.63 0.49 0.36 0.24 0.16 0.18 0.3 0.52 0.73 0.84 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.93 20.13 20.29 20.41 20.44 20.46 20.46 20.46 20.45 20.4 20.21 19.9 (90)

Living area fraction

0.36 (91)

Mean internal temperature (for the whole dwelling)

20.16 20.35 20.5 20.61 20.64 20.65 20.65 20.65 20.65 20.6 20.42 20.13 (92)

Adjusted mean internal temperature:

20.01 20.2 20.35 20.46 20.49 20.5 20.5 20.5 20.5 20.45 20.27 19.98 (93)

8. Space heating requirement

Utilisation factor for gains,

0.81	0.73	0.63	0.49	0.36	0.24	0.17	0.18	0.31	0.52	0.72	0.83	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

394.15	411.15	390.85	332.12	255.05	168.37	111.4	116.63	183.78	280.14	349.41	384.1	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

473.95	459.81	414.51	338.64	256.4	168.51	111.42	116.66	184.25	287.49	387.51	468.36	(97)
--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

59.37	32.7	17.6	4.7	1	0	0	0	0	5.46	27.43	62.69	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

59.37	32.7	17.6	4.7	1	0	0	0	0	5.46	27.43	62.69	(98c)
-------	------	------	-----	---	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m ² /year												4.22	(99)
---	--	--	--	--	--	--	--	--	--	--	--	------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
58.84 32.41 17.45 4.65 0.99 0 0 0 0 5.41 27.19 62.13			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
92.81 92.15 91.53 91.03 90.85 90.8 90.8 90.8 90.8 91.07 91.96 92.92			(217)
Fuel for water heating			
231.47 206.27 220.7 195.09 189.52 170.89 168.58 175.2 177.05 196.84 207.32 228.66		2367.6	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		209.07	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2367.6	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	107.06 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		193.06	(231)
Electricity for lighting		124.71	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	2894.43	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.61 (240a)
Low-rate fraction	0		7.61 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.61 (241a)
Low-rate fraction	0		7.61 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.61 (242a)

Low-rate fraction	0	7.61	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	86.18	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	31.83	(249)
Energy For lighting	0	20.56	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	238.19	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.9	(257)
SAP rating	85.37	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			43.9	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			497.2	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		541.1	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		26.78	(267)
Electricity for lighting		18	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		585.88	(272)
Dwelling CO ₂ Emission Rate		11.72	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			236.25	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2675.38	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			2911.63	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			292.05	(281)
Electricity for lighting			191.28	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3394.97	(286)
Dwelling PE Rate			67.9	(287)

Dwelling Reference: 406
Dwelling Type: New Dwelling Design Stage
406
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.4	0.4	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.31	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.4	0.39	0.38	0.34	0.34	0.3	0.3	0.29	0.31	0.34	0.35	0.37	4.11	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air change rate														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)
Effective air change rate from PCDB:														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	5.23	407.12	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²														40.77	(31)
Party Wall								0						1198.8	(32)
Party floor														2000	(32a)
Party ceiling														1500	(32b)
Internal wall **														729	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$														18.29	(33)
Heat capacity Cm = $\sum(A \times k)$														5834.92	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K														116.7	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K														2.04	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available														2.04	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$														20.32	(37)
Ventilation heat loss calculated monthly															
	24.87	24.73	24.6	23.99	23.88	23.35	23.35	23.25	23.55	23.88	24.11	24.35			(38)
Heat transfer coefficient, W/K															
	45.19	45.06	44.93	44.32	44.2	43.67	43.67	43.57	43.88	44.2	44.43	44.68			(39)
Heat loss parameter (HLP), W/m ² K															
	0.9	0.9	0.9	0.89	0.88	0.87	0.87	0.87	0.88	0.88	0.89	0.89			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
216.4 191.51 203.59 179.12 173.76 156.69 154.64 160.65 162.28 180.84 192.16 214.04 2185.67		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
24.03 21.25 22.25 18.42 17.17 14.69 13.77 14.65 15.2 17.92 20.3 23.58		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
192.38 170.26 181.33 160.69 156.59 142 140.87 146 147.08 162.91 171.86 190.46 1962.43		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
93.74 83.35 89.48 80.64 79.56 73.18 73.2 75.2 75.04 81.91 84.97 92.95		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

75.37	83.44	75.37	77.88	75.37	77.88	75.37	75.37	77.88	75.37	77.88	75.37	(67)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23	148.76	144.91	136.72	126.37	116.64	110.15	108.62	112.47	120.67	131.01	140.74	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	(71)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Water heating gains (Table 5)

125.99	124.03	120.26	112	106.93	101.64	98.39	101.07	104.22	110.1	118.02	124.93	(72)
--------	--------	--------	-----	--------	--------	-------	--------	--------	-------	--------	--------	------

Total internal gains

399.94	407.59	391.89	377.94	360.02	344.51	332.25	333.41	342.92	357.48	378.26	392.39	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

82.3	146.75	214.35	281.99	326.24	327.23	314.18	281.47	238.25	166.22	99.86	69.54	(83)
------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	------

Total gains – internal and solar (watts)

482.24	554.34	606.24	659.93	686.26	671.75	646.44	614.88	581.17	523.7	478.13	461.93	(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, $\eta_{1,m}$ (see Table 9a)

0.91	0.86	0.8	0.69	0.55	0.4	0.29	0.32	0.49	0.72	0.86	0.92	(86)
------	------	-----	------	------	-----	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.73	20.01	20.33	20.67	20.87	20.97	20.99	20.99	20.93	20.67	20.17	19.68	(87)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

20.16	20.17	20.17	20.18	20.18	20.19	20.19	20.19	20.19	20.18	20.18	20.17	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.9	0.85	0.78	0.66	0.51	0.36	0.24	0.27	0.44	0.69	0.84	0.91	(89)
-----	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

18.7	19.04	19.43	19.84	20.06	20.17	20.19	20.19	20.13	19.85	19.26	18.65	(90)
------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.36	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.07	19.39	19.76	20.14	20.35	20.45	20.48	20.47	20.42	20.15	19.58	19.02	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.07	19.39	19.76	20.14	20.35	20.45	20.48	20.47	20.42	20.15	19.58	19.02	(93)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.88	0.83	0.77	0.66	0.52	0.37	0.26	0.29	0.46	0.69	0.83	0.89	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

423.75	460.81	464.42	432.93	358.12	250.08	168.07	175.86	265.78	358.82	395.94	410.7	(95)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	------

Monthly average external temperature from Table U1

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

667.38	652.89	595.55	498	382.56	255.68	169.26	177.54	277.4	421.92	554.73	662.1	(97)
--------	--------	--------	-----	--------	--------	--------	--------	-------	--------	--------	-------	------

Space heating requirement for each month

181.26	129.08	97.56	46.85	18.18	0	0	0	0	46.95	114.33	187.04	(98a)
--------	--------	-------	-------	-------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

181.26	129.08	97.56	46.85	18.18	0	0	0	0	46.95	114.33	187.04	(98c)
--------	--------	-------	-------	-------	---	---	---	---	-------	--------	--------	-------

Space heating requirement in kWh/m²/year

16.43 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(105)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													92.3	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	196.38	139.84	105.7	50.76	19.7	0	0	0	0	50.87	123.87	202.64		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												79.8	(216)	
Efficiency of water heater															
	83.93	83.45	82.73	81.67	80.65	79.8	79.8	79.8	79.8	81.65	83.17	84.02		(217)	
Fuel for water heating															
	229.22	204.03	219.18	196.76	194.15	177.94	176.52	182.96	184.31	199.52	206.64	226.68	2397.94	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													889.76	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													2397.94	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													41	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													86	(231)	
Electricity for lighting													126.38	(232)	

Low-rate fraction	0	32.39	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	87.28	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	20.84	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-50.29	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	196.4	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.74	(257)
SAP rating	87.94	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			186.85	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			503.57	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		690.42	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		18.24	(268)
energy saved or generated	0	-53.51	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		667.07	(272)
Dwelling CO ₂ Emission Rate		13.34	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1005.43	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2709.67	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3715.1	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			193.85	(282)
energy saved or generated	0		-447.39	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3591.66	(286)
Dwelling PE Rate			71.83	(287)

Dwelling Reference: 407
Dwelling Type: New Dwelling Design Stage
 407
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.14	274.82	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													31.32	(31)
Party Wall													939.6	(32)
Party floor													2000	(32a)
Party ceiling													1500	(32b)
Internal wall **													729	(33c)
Internal floor													0	(32d)
Internal ceiling floor													0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$													16.19	(33)
Heat capacity $C_m = \sum (A \times k)$													5443.42	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K													108.87	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.57	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.57	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$													17.76	(37)
Ventilation heat loss calculated monthly														
	10.43	10.31	10.18	9.56	9.44	8.81	8.81	8.69	9.06	9.44	9.69	9.94		(38)
Heat transfer coefficient, W/K														
	28.19	28.07	27.94	27.32	27.2	26.57	26.57	26.45	26.82	27.2	27.44	27.69		(39)
Heat loss parameter (HLP), W/m ² K														
	0.56	0.56	0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(40)
Number of days in month (Table 1a)														
	31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)														(42a)
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)														(42b)
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)														(42c)
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = $0.15 \times (45)$														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
92.48 82.22 88.22 79.42 78.3 71.96 71.94 73.94 73.82 80.65 83.76 91.69		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.37 82.33 74.37 76.85 74.37 76.85 74.37 74.37 76.85 74.37 76.85 74.37 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23 148.76 144.91 136.72 126.37 116.64 110.15 108.62 112.47 120.67 131.01 140.74 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 (71)

Water heating gains (Table 5)

124.3 122.35 118.57 110.31 105.24 99.95 96.7 99.39 102.53 108.41 116.33 123.25 (72)

Total internal gains

397.25 404.79 389.2 375.22 357.33 341.79 329.57 330.72 340.2 354.79 375.54 389.7 (73)

6. Solar gains

Solar gains in watts, calculated for each month

61.35 120.01 197.63 288.24 353.24 361.61 344.27 295.72 229.86 142.4 76.49 50.45 (83)

Total gains – internal and solar (watts)

458.6 524.8 586.84 663.45 710.57 703.4 673.83 626.44 570.06 497.19 452.03 440.15 (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, $\eta_{1,m}$ (see Table 9a)

0.83 0.75 0.65 0.49 0.35 0.24 0.17 0.19 0.32 0.55 0.75 0.84 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.57 20.73 20.87 20.97 20.99 21 21 21 21 20.96 20.79 20.55 (87)

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

20.46 20.46 20.47 20.48 20.48 20.49 20.49 20.49 20.49 20.48 20.48 20.47 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.82 0.74 0.63 0.47 0.33 0.22 0.15 0.17 0.3 0.53 0.73 0.83 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.97 20.16 20.33 20.45 20.47 20.49 20.49 20.49 20.49 20.44 20.24 19.95 (90)

Living area fraction

0.36 (91)

Mean internal temperature (for the whole dwelling)

20.18 20.37 20.53 20.63 20.66 20.67 20.67 20.68 20.67 20.62 20.44 20.17 (92)

Adjusted mean internal temperature:

20.03 20.22 20.38 20.48 20.51 20.52 20.52 20.53 20.52 20.47 20.29 20.02 (93)

8. Space heating requirement

Utilisation factor for gains,

0.81	0.73	0.62	0.47	0.34	0.22	0.15	0.17	0.3	0.53	0.72	0.82	(94)
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Useful gains, mGm , W

369.96	383.63	366.14	311.26	238.68	157.33	104.28	109.11	171.77	261.52	326.35	361.23	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

443.59	429.93	387.75	316.49	239.64	157.42	104.29	109.13	172.18	268.53	361.99	438.02	(97)
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Space heating requirement for each month

54.78	31.11	16.08	3.76	0.71	0	0	0	0	5.21	25.67	57.13	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

54.78	31.11	16.08	3.76	0.71	0	0	0	0	5.21	25.67	57.13	(98c)
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Space heating requirement in kWh/m²/year

3.89

(99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(108)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

0

0

0

8f. Space heating requirement

Fabric Energy Efficiency,	0	0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
54.29 30.83 15.93 3.73 0.7 0 0 0 0 5.17 25.44 56.62			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
92.68 92.1 91.48 90.99 90.84 90.8 90.8 90.8 90.8 91.06 91.89 92.77			(217)
Fuel for water heating			
231.79 206.4 220.84 195.19 189.56 170.89 168.58 175.2 177.05 196.87 207.47 229.03		2368.86	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		192.71	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2368.86	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	107.06 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		193.06	(231)
Electricity for lighting		124.71	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
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Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	2879.34	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.01	(240a)
Low-rate fraction	0		7.01	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.01	(241a)
Low-rate fraction	0		7.01	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		7.01	(242a)

Low-rate fraction	0	7.01	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	86.23	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	31.83	(249)
Energy For lighting	0	20.56	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	237.64	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.9	(257)
SAP rating	85.4	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			40.47	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			497.46	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		537.93	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		26.78	(267)
Electricity for lighting		18	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		582.71	(272)
Dwelling CO ₂ Emission Rate		11.65	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			217.76	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2676.82	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			2894.58	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			292.05	(281)
Electricity for lighting			191.28	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3377.91	(286)
Dwelling PE Rate			67.56	(287)

Dwelling Reference: 407
Dwelling Type: New Dwelling Design Stage
407
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.4	0.4	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.31	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.4	0.39	0.38	0.34	0.34	0.3	0.3	0.29	0.31	0.34	0.35	0.37	4.11	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air change rate														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)
Effective air change rate from PCDB:														
	0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.53	274.82	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²														31.32	(31)
Party Wall								0						939.6	(32)
Party floor														2000	(32a)
Party ceiling														1500	(32b)
Internal wall **														729	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$														16.59	(33)
Heat capacity Cm = $\sum(A \times k)$														5443.42	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K														108.87	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K														1.57	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available														1.57	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$														18.15	(37)
Ventilation heat loss calculated monthly															
	24.87	24.73	24.6	23.99	23.88	23.35	23.35	23.25	23.55	23.88	24.11	24.35			(38)
Heat transfer coefficient, W/K															
	43.02	42.88	42.75	42.14	42.03	41.5	41.5	41.4	41.7	42.03	42.26	42.5			(39)
Heat loss parameter (HLP), W/m ² K															
	0.86	0.86	0.86	0.84	0.84	0.83	0.83	0.83	0.83	0.84	0.85	0.85			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
216.4 191.51 203.59 179.12 173.76 156.69 154.64 160.65 162.28 180.84 192.16 214.04 2185.67		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
24.03 21.25 22.25 18.42 17.17 14.69 13.77 14.65 15.2 17.92 20.3 23.58		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
192.38 170.26 181.33 160.69 156.59 142 140.87 146 147.08 162.91 171.86 190.46 1962.43		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
93.74 83.35 89.48 80.64 79.56 73.18 73.2 75.2 75.04 81.91 84.97 92.95		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

75.37	83.44	75.37	77.88	75.37	77.88	75.37	75.37	77.88	75.37	77.88	75.37	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23	148.76	144.91	136.72	126.37	116.64	110.15	108.62	112.47	120.67	131.01	140.74	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	(71)
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Water heating gains (Table 5)

125.99	124.03	120.26	112	106.93	101.64	98.39	101.07	104.22	110.1	118.02	124.93	(72)
--------	--------	--------	-----	--------	--------	-------	--------	--------	-------	--------	--------	------

Total internal gains

399.94	407.59	391.89	377.94	360.02	344.51	332.25	333.41	342.92	357.48	378.26	392.39	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

56.36	110.26	181.58	264.82	324.54	332.23	316.29	271.69	211.18	130.83	70.28	46.35	(83)
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Total gains – internal and solar (watts)

456.31	517.84	573.47	642.76	684.56	676.74	648.55	605.1	554.1	488.31	448.54	438.74	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.91	0.87	0.8	0.68	0.53	0.38	0.28	0.31	0.49	0.73	0.86	0.92	(86)
------	------	-----	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.7	19.96	20.31	20.68	20.88	20.97	20.99	20.99	20.93	20.65	20.14	19.66	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.2	20.2	20.21	20.22	20.22	20.23	20.23	20.23	20.22	20.22	20.21	20.21	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.9	0.85	0.78	0.65	0.49	0.34	0.23	0.26	0.44	0.69	0.85	0.91	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

18.69	19.02	19.44	19.88	20.11	20.21	20.22	20.22	20.17	19.86	19.25	18.65	(90)
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Living area fraction

												0.36	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.05	19.36	19.75	20.17	20.39	20.48	20.5	20.5	20.44	20.14	19.57	19.01	(92)
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Adjusted mean internal temperature:

19.05	19.36	19.75	20.17	20.39	20.48	20.5	20.5	20.44	20.14	19.57	19.01	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.88	0.83	0.77	0.64	0.5	0.35	0.25	0.28	0.46	0.69	0.83	0.89	(94)
------	------	------	------	-----	------	------	------	------	------	------	------	------

Useful gains, mGm , W

400.41	431.94	439.18	414.4	343.62	239.27	160.8	168.12	253.04	337.71	372.19	389.15	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

634.62	620.12	566.57	474.75	365.09	244.05	161.85	169.68	264.53	401.11	526.96	629.53	(97)
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Space heating requirement for each month

174.25	126.46	94.78	43.46	15.97	0	0	0	0	47.16	111.43	178.84	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

174.25	126.46	94.78	43.46	15.97	0	0	0	0	47.16	111.43	178.84	(98c)
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Space heating requirement in kWh/m²/year

15.85 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		92.3	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
188.79 137.01 102.68 47.08 17.31 0 0 0 0 51.1 120.73 193.76			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	79.8	(216)
Efficiency of water heater			
83.84 83.4 82.68 81.56 80.56 79.8 79.8 79.8 79.8 81.66 83.11 83.92			(217)
Fuel for water heating			
229.46 204.14 219.33 197.02 194.38 177.94 176.52 182.96 184.31 199.51 206.78 226.95		2399.32	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		858.46	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2399.32	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	0 (230a)
warm air heating system fans			0 (230b)
Heating circulation pump or water pump within warm air heating unit			41 (230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)			0 (230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)			45 (230e)
Maintaining electric keep-hot facility for gas combi boiler			0 (230f)
Pump for solar water heating			0 (230g)
Pump for storage WWHRs			0 (230h)
Total electricity for the above		86	(231)
Electricity for lighting		126.38	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

9.55	14.51	22.44	27.23	31.17	29.77	29.43	26.88	22.72	17.45	10.87	8.14	250.16	(233a)
------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

2.65	5.75	11.78	18.2	24.58	24.87	24.56	20.55	14.76	8.38	3.58	2.08	161.74	(233b)
------	------	-------	------	-------	-------	-------	-------	-------	------	------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			3058.27	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		31.25	(240a)
Low-rate fraction	0		31.25	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		31.25	(241a)
Low-rate fraction	0		31.25	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		31.25	(242a)

Low-rate fraction	0	31.25	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	87.34	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	20.84	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-50.29	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	195.31	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.74	(257)
SAP rating	88	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			180.28	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			503.86	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		684.13	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		18.24	(268)
energy saved or generated	0	-53.51	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		660.79	(272)
Dwelling CO ₂ Emission Rate		13.22	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			970.06	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2711.23	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3681.29	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			193.85	(282)
energy saved or generated	0		-447.39	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3557.85	(286)
Dwelling PE Rate			71.16	(287)

Dwelling Reference: 408
Dwelling Type: New Dwelling Design Stage
408
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	87 (1a) x 2.6	(2a) =	226.2 (3a)
Total floor area TFA			87 (4)
Dwelling volume			226.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	22.69		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	10.5	918.82	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		87.75	(31)
Party Wall	0	626.4	(32)
Party floor		3480	(32a)
Party ceiling		2610	(32b)
Internal wall **		972	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		35.5	(33)
Heat capacity $C_m = \sum (A \times k)$		8607.22	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		98.93	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		4.39	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		4.39	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		39.88	(37)
Ventilation heat loss calculated monthly			
	19.23 18.99 18.75 17.56 17.32 16.13 16.13 15.89 16.61 17.32 17.8 18.27		(38)
Heat transfer coefficient, W/K			
	59.11 58.87 58.63 57.44 57.21 56.02 56.02 55.78 56.49 57.21 57.68 58.16		(39)
Heat loss parameter (HLP), W/m ² K			
	0.68 0.68 0.67 0.66 0.66 0.64 0.64 0.64 0.65 0.66 0.66 0.67		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.58	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	67.52 66.5 65.02 62.2 60.11 57.78 56.46 57.92 59.53 62.03 64.92 67.26		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	29.16 28.73 28.12 26.99 26.15 25.22 24.71 25.32 25.98 26.97 28.12 29.06		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	41.08 39.58 38.09 36.6 35.1 33.61 33.61 35.1 36.6 38.09 39.58 41.08		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		126.8	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	137.75 134.81 131.23 125.78 121.36 116.6 114.78 118.34 122.1 127.1 132.63 137.4	1519.88	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	218.17 191.97 201.69 172.19 163.37 143.38 138.81 146.53 150.57 172.47 188.95 215.13	2103.22	(45)
Distribution loss (46) = $0.15 \times (45)$			
	32.72 28.8 30.25 25.83 24.51 21.51 20.82 21.98 22.58 25.87 28.34 32.27		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
263.19 232.64 246.72 215.76 208.4 186.95 183.84 191.56 194.14 217.49 232.52 260.15 2633.35		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
263.19 232.64 246.72 215.76 208.4 186.95 183.84 191.56 194.14 217.49 232.52 260.15 2633.35		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
108.56 96.36 103.08 92.11 90.34 82.53 82.17 84.74 84.92 93.37 97.68 107.55		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

117.75	130.36	117.75	121.67	117.75	121.67	117.75	117.75	121.67	117.75	121.67	117.75	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

233.45	235.87	229.77	216.77	200.37	184.95	174.65	172.22	178.33	191.33	207.73	223.15	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	(71)
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Water heating gains (Table 5)

145.91	143.4	138.55	127.93	121.43	114.63	110.45	113.9	117.95	125.49	135.67	144.56	(72)
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Total internal gains

561.85	574.37	550.8	531.11	504.28	482.98	464.58	465.61	479.68	499.3	529.81	550.19	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

129.49	253.3	417.15	608.4	745.61	763.27	726.66	624.19	485.17	300.57	161.45	106.48	(83)
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Total gains – internal and solar (watts)

691.33	827.67	967.96	1139.51	1249.89	1246.25	1191.24	1089.8	964.85	799.87	691.27	656.67	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.9	0.84	0.73	0.57	0.42	0.29	0.21	0.23	0.4	0.66	0.84	0.91	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.97	20.28	20.61	20.87	20.97	20.99	21	21	20.98	20.81	20.38	19.93	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.36	20.36	20.36	20.38	20.38	20.39	20.39	20.39	20.39	20.38	20.37	20.37	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.89	0.82	0.71	0.55	0.39	0.26	0.18	0.2	0.36	0.63	0.83	0.9	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

19.15	19.53	19.92	20.24	20.34	20.39	20.39	20.39	20.37	20.18	19.67	19.11	(90)
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Living area fraction

												0.21	(91)
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Mean internal temperature (for the whole dwelling)

19.32	19.69	20.06	20.37	20.47	20.51	20.52	20.52	20.49	20.31	19.82	19.28	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.17	19.54	19.91	20.22	20.32	20.36	20.37	20.37	20.34	20.16	19.67	19.13	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.87	0.8	0.7	0.54	0.39	0.26	0.18	0.2	0.36	0.62	0.81	0.88	(94)
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Useful gains, mGm, W

601.53	664.73	677.43	614.09	484.36	321.41	210.72	220.9	347.92	498.15	558.82	579.95	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

879.1	861.68	786.56	650.14	493.3	322.74	210.94	221.28	352.74	547.16	724.87	868.1	(97)
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Space heating requirement for each month

206.51	132.35	81.19	25.95	6.65	0	0	0	0	36.47	119.56	214.39	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

206.51	132.35	81.19	25.95	6.65	0	0	0	0	36.47	119.56	214.39	(98c)
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Space heating requirement in kWh/m ² /year												9.46	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
204.67 131.17 80.47 25.72 6.59 0 0 0 0 36.14 118.5 212.48			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
94.98 94.22 93.11 91.79 91.08 90.8 90.8 90.8 90.8 92.12 94 95.1			(217)
Fuel for water heating			
277.1 246.91 264.98 235.07 228.8 205.89 202.46 210.97 213.81 236.09 247.38 273.55		2843.01	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		815.73	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2843.01	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	186.28 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		272.28	(231)
Electricity for lighting		197.45	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	4128.46	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		29.69 (240a)
Low-rate fraction	0		29.69 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		29.69 (241a)
Low-rate fraction	0		29.69 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		29.69 (242a)

Low-rate fraction	0	29.69	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.49	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	44.9	(249)
Energy For lighting	0	32.56	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	302.64	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.83	(257)
SAP rating	86.62	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			171.3	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			597.03	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		768.33	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		37.77	(267)
Electricity for lighting		28.5	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		834.6	(272)
Dwelling CO ₂ Emission Rate		9.59	(273)
EI rating		92	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			921.78	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3212.6	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4134.37	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			411.9	(281)
Electricity for lighting			302.86	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4849.13	(286)
Dwelling PE Rate			55.74	(287)

Dwelling Reference: 408
 Dwelling Type: New Dwelling Design Stage
 408
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	87 (1a) x 2.6	(2a) =	226.2 (3a)
Total floor area TFA			87 (4)
Dwelling volume			226.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.09	0.09	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.34	0.34	(18)
Number of sides on which dwelling is sheltered		2	2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.29	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.27	0.29	0.31	0.32	0.34	3.78	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(24d)
Effective air change rate														
	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)
Effective air change rate from PCDB:														
	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	22.27		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	11.88	924	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		87.75	(31)
Party Wall	0	626.4	(32)
Party floor		3480	(32a)
Party ceiling		2610	(32b)
Internal wall **		972	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		36.45	(33)
Heat capacity $C_m = \sum (A \times k)$		8612.4	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		98.99	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		4.39	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		4.39	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		40.84	(37)
Ventilation heat loss calculated monthly			
	42.34 42.15 41.96 41.06 40.89 40.11 40.11 39.97 40.41 40.89 41.23 41.59		(38)
Heat transfer coefficient, W/K			
	83.18 82.99 82.8 81.9 81.73 80.95 80.95 80.8 81.25 81.73 82.07 82.43		(39)
Heat loss parameter (HLP), W/m ² K			
	0.96 0.95 0.95 0.94 0.94 0.93 0.93 0.93 0.93 0.94 0.94 0.95		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.58	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	67.52 66.5 65.02 62.2 60.11 57.78 56.46 57.92 59.53 62.03 64.92 67.26		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	29.16 28.73 28.12 26.99 26.15 25.22 24.71 25.32 25.98 26.97 28.12 29.06		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	41.08 39.58 38.09 36.6 35.1 33.61 33.61 35.1 36.6 38.09 39.58 41.08		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		126.8	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	137.75 134.81 131.23 125.78 121.36 116.6 114.78 118.34 122.1 127.1 132.63 137.4	1519.88	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	218.17 191.97 201.69 172.19 163.37 143.38 138.81 146.53 150.57 172.47 188.95 215.13	2103.22	(45)
Distribution loss (46) = $0.15 \times (45)$			
	32.72 28.8 30.25 25.83 24.51 21.51 20.82 21.98 22.58 25.87 28.34 32.27		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
264.76 234.05 248.29 217.28 209.97 188.47 185.41 193.13 195.66 219.06 234.04 261.72 2651.84		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
30.87 27.3 28.59 23.67 22.06 18.88 17.69 18.82 19.53 23.02 26.08 30.29		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
233.89 206.76 219.7 193.61 187.91 169.59 167.71 174.31 176.13 196.04 207.96 231.43 2365.04		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
109.82 97.5 104.34 93.33 91.6 83.75 83.43 86 86.14 94.62 98.9 108.81		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

117.74	130.36	117.74	121.67	117.74	121.67	117.74	117.74	121.67	117.74	121.67	117.74	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

233.45	235.87	229.77	216.77	200.37	184.95	174.65	172.22	178.33	191.33	207.73	223.15	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	-103.3	(71)
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Water heating gains (Table 5)

147.6	145.09	140.24	129.62	123.11	116.31	112.14	115.59	119.63	127.18	137.36	146.24	(72)
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Total internal gains

563.53	576.05	552.49	532.79	505.96	484.67	466.26	467.29	481.37	500.98	531.49	551.87	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

116.75	228.38	376.11	548.53	672.24	688.16	655.16	562.77	437.43	270.99	145.57	96.01	(83)
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Total gains – internal and solar (watts)

680.27	804.43	928.59	1081.32	1178.2	1172.83	1121.42	1030.06	918.79	771.97	677.06	647.88	(84)
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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, $\eta_{1,m}$ (see Table 9a)

0.93	0.9	0.83	0.71	0.57	0.42	0.31	0.35	0.55	0.78	0.9	0.94	(86)
------	-----	------	------	------	------	------	------	------	------	-----	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.09	19.44	19.92	20.44	20.77	20.93	20.98	20.97	20.85	20.37	19.65	19.03	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.12	20.12	20.12	20.13	20.13	20.14	20.14	20.14	20.14	20.13	20.13	20.13	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.92	0.88	0.81	0.68	0.53	0.37	0.25	0.29	0.49	0.75	0.89	0.93	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

17.89	18.33	18.91	19.54	19.92	20.09	20.13	20.12	20.01	19.48	18.6	17.82	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	------

Living area fraction

												0.21	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

18.14	18.56	19.12	19.73	20.09	20.26	20.31	20.3	20.19	19.67	18.82	18.07	(92)
-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

18.14	18.56	19.12	19.73	20.09	20.26	20.31	20.3	20.19	19.67	18.82	18.07	(93)
-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.9	0.86	0.79	0.67	0.53	0.38	0.26	0.3	0.49	0.73	0.86	0.91	(94)
-----	------	------	------	------	------	------	-----	------	------	------	------	------

Useful gains, mGm , W

611.53	688.44	731.19	723.04	620.12	440.83	295.54	308.58	454.58	564.62	581.84	588.51	(95)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

1151.03	1133.31	1044.73	886.84	685.95	458.4	299.94	315.1	494.41	740.93	961.53	1143.22	(97)
---------	---------	---------	--------	--------	-------	--------	-------	--------	--------	--------	---------	------

Space heating requirement for each month

401.39	298.96	233.27	117.94	48.98	0	0	0	0	131.18	273.38	412.71	(98a)
--------	--------	--------	--------	-------	---	---	---	---	--------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

401.39	298.96	233.27	117.94	48.98	0	0	0	0	131.18	273.38	412.71	(98c)
--------	--------	--------	--------	-------	---	---	---	---	--------	--------	--------	-------

Space heating requirement in kWh/m ² /year												22.04	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	434.87	323.89	252.73	127.77	53.06	0	0	0	0	142.12	296.18	447.14			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	85.26	84.89	84.19	82.98	81.51	79.8	79.8	79.8	79.8	83.18	84.67	85.34			(217)	
Fuel for water heating																
	274.33	243.57	260.95	233.31	230.54	212.52	210.17	218.44	220.71	235.68	245.6	271.18	2856.99		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													2077.77	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2856.99	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													197.44	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

16.35	24.67	37.92	45.7	52	49.53	48.91	44.81	38.08	29.5	18.53	13.95	419.95	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

4.89	10.58	21.62	33.36	45	45.55	45.03	37.72	27.12	15.43	6.61	3.84	296.75	(233b)
------	-------	-------	-------	----	-------	-------	-------	-------	-------	------	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			4501.51	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		75.63	(240a)
Low-rate fraction	0		75.63	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		75.63	(241a)
Low-rate fraction	0		75.63	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		75.63	(242a)

Low-rate fraction	0	75.63	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.99	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	32.56	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-85.86	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	232.5	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.63	(257)
SAP rating	89.72	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			436.33	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			599.97	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		1036.3	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		28.5	(268)
energy saved or generated	0	-93.06	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		983.67	(272)
Dwelling CO ₂ Emission Rate		11.31	(273)
EI rating		90	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			2347.88	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3228.4	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			5576.29	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			302.84	(282)
energy saved or generated	0		-762.91	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5246.32	(286)
Dwelling PE Rate			60.3	(287)

Dwelling Reference: 409
Dwelling Type: New Dwelling Design Stage
 409
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	86 (1a) x 2.6	(2a) =	223.6 (3a)
Total floor area TFA			86 (4)
Dwelling volume			223.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	12.74		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	15.26	1335.32	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		108.81	(31)
Party Wall	0	156.6	(32)
Party floor		3440	(32a)
Party ceiling		2580	(32b)
Internal wall **		1069.2	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		30.31	(33)
Heat capacity $C_m = \sum (A \times k)$		8581.12	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		99.78	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		5.44	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		5.44	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		35.75	(37)
Ventilation heat loss calculated monthly			
	19.01 18.77 18.53 17.36 17.12 15.95 15.95 15.71 16.42 17.12 17.59 18.06		(38)
Heat transfer coefficient, W/K			
	54.75 54.52 54.28 53.1 52.87 51.69 51.69 51.46 52.16 52.87 53.34 53.81		(39)
Heat loss parameter (HLP), W/m ² K			
	0.64 0.63 0.63 0.62 0.61 0.6 0.6 0.6 0.61 0.61 0.62 0.63		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.57	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	67.26 66.25 64.77 61.96 59.88 57.56 56.24 57.7 59.3 61.79 64.67 67		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	29.05 28.62 28.01 26.89 26.05 25.12 24.62 25.22 25.88 26.87 28.01 28.95		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	40.92 39.43 37.94 36.45 34.97 33.48 33.48 34.97 36.45 37.94 39.43 40.92		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		126.32	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	137.22 134.29 130.72 125.3 120.89 116.16 114.33 117.89 121.63 126.61 132.12 136.87	1514.03	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	217.33 191.23 200.92 171.53 162.74 142.83 138.28 145.97 149.99 171.81 188.23 214.3	2095.14	(45)
Distribution loss (46) = $0.15 \times (45)$			
	32.6 28.68 30.14 25.73 24.41 21.42 20.74 21.9 22.5 25.77 28.23 32.15		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
262.35 231.9 245.94 215.1 207.77 186.4 183.3 190.99 193.56 216.83 231.8 259.33 2625.27		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
262.35 231.9 245.94 215.1 207.77 186.4 183.3 190.99 193.56 216.83 231.8 259.33 2625.27		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
108.28 96.12 102.83 91.89 90.13 82.35 82 84.55 84.73 93.14 97.44 107.27		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

123.81	137.08	123.81	127.94	123.81	127.94	123.81	123.81	127.94	123.81	127.94	123.81	(67)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

231.52	233.93	227.87	214.98	198.71	183.42	173.21	170.8	176.86	189.75	206.02	221.31	(68)
--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	(71)
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

Water heating gains (Table 5)

145.54	143.03	138.21	127.63	121.15	114.37	110.21	113.65	117.68	125.19	135.34	144.19	(72)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Total internal gains

565.38	578.54	554.39	535.05	508.17	487.23	468.73	469.77	483.98	503.26	533.79	553.81	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

58.12	112.92	187.69	282.01	356.53	370.64	350.48	293.12	220.49	134.12	72.24	47.99	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	------

Total gains – internal and solar (watts)

623.5	691.46	742.08	817.06	864.7	857.88	819.21	762.89	704.47	637.37	606.04	601.8	(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, $\eta_{1,m}$ (see Table 9a)

0.92	0.88	0.82	0.69	0.54	0.38	0.28	0.31	0.49	0.74	0.87	0.92	(86)
------	------	------	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.01	20.22	20.48	20.78	20.93	20.99	21	21	20.96	20.77	20.38	19.99	(87)
-------	-------	-------	-------	-------	-------	----	----	-------	-------	-------	-------	------

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

20.4	20.4	20.4	20.41	20.42	20.43	20.43	20.43	20.42	20.42	20.41	20.41	(88)
------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.91	0.87	0.8	0.67	0.51	0.35	0.24	0.27	0.46	0.71	0.86	0.91	(89)
------	------	-----	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

19.23	19.49	19.81	20.18	20.35	20.42	20.43	20.43	20.39	20.17	19.7	19.21	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	------

Living area fraction

												0.19	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.38	19.63	19.94	20.29	20.46	20.53	20.54	20.54	20.5	20.29	19.83	19.36	(92)
-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	------

Adjusted mean internal temperature:

19.23	19.48	19.79	20.14	20.31	20.38	20.39	20.39	20.35	20.14	19.68	19.21	(93)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.89	0.85	0.79	0.66	0.51	0.35	0.24	0.27	0.45	0.7	0.84	0.9	(94)
------	------	------	------	------	------	------	------	------	-----	------	-----	------

Useful gains, mGm , W

553.53	586.37	583.1	539.04	438.11	296.08	195.38	204.56	318.29	444.53	507.7	539.33	(95)
--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	-------	--------	------

Monthly average external temperature from Table U1

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

817.35	794.95	721.6	597.16	455.32	298.74	195.81	205.26	326.23	504.16	671.11	807.73	(97)
--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

196.28	140.17	103.05	41.84	12.8	0	0	0	0	44.37	117.66	199.69	(98a)
--------	--------	--------	-------	------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

196.28	140.17	103.05	41.84	12.8	0	0	0	0	44.37	117.66	199.69	(98c)
--------	--------	--------	-------	------	---	---	---	---	-------	--------	--------	-------

Space heating requirement in kWh/m²/year

9.95

(99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(105)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

0

(108)

8f. Space heating requirement

Fabric Energy Efficiency,	0	0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
194.53 138.92 102.13 41.47 12.69 0 0 0 0 43.97 116.61 197.91			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
94.86 94.36 93.57 92.3 91.33 90.8 90.8 90.8 90.8 92.37 93.97 94.93			(217)
Fuel for water heating			
276.56 245.76 262.86 233.03 227.49 205.28 201.87 210.35 213.17 234.74 246.68 273.16		2830.96	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		848.23	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2830.96	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	187.54 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		273.54	(231)
Electricity for lighting		207.62	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	4160.34	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		30.88 (240a)
Low-rate fraction	0		30.88 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		30.88 (241a)
Low-rate fraction	0		30.88 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		30.88 (242a)

Low-rate fraction	0	30.88	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.05	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	45.11	(249)
Energy For lighting	0	34.24	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	305.27	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.84	(257)
SAP rating	86.4	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			178.13	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			594.5	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		772.63	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		37.94	(267)
Electricity for lighting		29.97	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		840.54	(272)
Dwelling CO ₂ Emission Rate		9.77	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			958.49	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3198.98	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4157.48	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			413.82	(281)
Electricity for lighting			318.45	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4889.75	(286)
Dwelling PE Rate			56.86	(287)

Dwelling Reference: 409
Dwelling Type: New Dwelling Design Stage
409
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	86 (1a) x 2.6	(2a) =	223.6 (3a)
Total floor area TFA			86 (4)
Dwelling volume			223.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	3	x 10 =	30	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.13	0.13	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.38	0.38	(18)
Number of sides on which dwelling is sheltered		2	2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.33	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.42	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.33	0.35	0.37	0.38	4.29	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(24d)
Effective air change rate														
	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(25)
Effective air change rate from PCDB:														
	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	12.74		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	17.17	1335.32	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													108.81	(31)												
Party Wall													0	156.6	(32)											
Party floor													3440	(32a)												
Party ceiling													2580	(32b)												
Internal wall **													1069.2	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\sum (A \times U)$													32.21	(33)												
Heat capacity Cm = $\sum(A \times k)$													8581.12	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													99.78	(35)												
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													5.44	(36)												
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													5.44	(36a)												
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													37.65	(37)												
Ventilation heat loss calculated monthly																										
													43.29	43.04	42.8	41.65	41.44	40.44	40.44	40.26	40.83	41.44	41.87	42.33	(38)	
Heat transfer coefficient, W/K																										
													80.94	80.69	80.45	79.31	79.09	78.1	78.1	77.91	78.48	79.09	79.53	79.98	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.94	0.94	0.94	0.92	0.92	0.91	0.91	0.91	0.91	0.92	0.92	0.93	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.57	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	67.26	66.25	64.77	61.96	59.88	57.56	56.24	57.7	59.3	61.79	64.67	67		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	29.05	28.62	28.01	26.89	26.05	25.12	24.62	25.22	25.88	26.87	28.01	28.95		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	40.92	39.43	37.94	36.45	34.97	33.48	33.48	34.97	36.45	37.94	39.43	40.92		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													126.32	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	137.22	134.29	130.72	125.3	120.89	116.16	114.33	117.89	121.63	126.61	132.12	136.87	1514.03	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	217.33	191.23	200.92	171.53	162.74	142.83	138.28	145.97	149.99	171.81	188.23	214.3	2095.14	(45)
Distribution loss (46) = 0.15 x (45)														
	32.6	28.68	30.14	25.73	24.41	21.42	20.74	21.9	22.5	25.77	28.23	32.15		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m [(47) - Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
263.92 233.32 247.51 216.62 209.34 187.92 184.87 192.56 195.08 218.4 233.32 260.9 2643.76		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
30.75 27.19 28.48 23.58 21.97 18.8 17.63 18.74 19.46 22.94 25.98 30.18		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
233.17 206.12 219.04 193.04 187.36 169.11 167.25 173.82 175.62 195.46 207.33 230.72 2358.06		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
109.54 97.25 104.08 93.11 91.39 83.56 83.25 85.81 85.94 94.4 98.66 108.53		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

127.46	141.12	127.46	131.71	127.46	131.71	127.46	127.46	131.71	127.46	131.71	127.46	(67)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

231.52	233.93	227.87	214.98	198.71	183.42	173.21	170.8	176.86	189.75	206.02	221.31	(68)
--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	(71)
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Water heating gains (Table 5)

147.23	144.72	139.89	129.31	122.83	116.06	111.9	115.34	119.37	126.88	137.03	145.87	(72)
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Total internal gains

570.72	584.27	559.73	540.51	513.52	492.7	474.07	475.11	489.44	508.6	539.26	559.15	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

53.4	103.75	172.44	259.09	327.56	340.53	322.01	269.31	202.58	123.22	66.37	44.09	(83)
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Total gains – internal and solar (watts)

624.12	688.02	732.18	799.61	841.08	833.23	796.08	744.42	692.02	631.82	605.63	603.24	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.94	0.92	0.89	0.81	0.7	0.54	0.41	0.45	0.65	0.84	0.92	0.95	(86)
------	------	------	------	-----	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.05	19.3	19.68	20.2	20.62	20.87	20.96	20.94	20.77	20.25	19.59	19.02	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.13	20.14	20.14	20.15	20.15	20.16	20.16	20.16	20.16	20.15	20.15	20.14	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.94	0.91	0.88	0.79	0.66	0.48	0.34	0.38	0.6	0.81	0.91	0.94	(89)
------	------	------	------	------	------	------	------	-----	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

17.84	18.16	18.64	19.29	19.77	20.06	20.14	20.13	19.95	19.35	18.53	17.81	(90)
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Living area fraction

												0.19	(91)
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Mean internal temperature (for the whole dwelling)

18.07	18.38	18.84	19.46	19.94	20.22	20.3	20.29	20.11	19.52	18.74	18.04	(92)
-------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

18.07	18.38	18.84	19.46	19.94	20.22	20.3	20.29	20.11	19.52	18.74	18.04	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.91	0.89	0.85	0.77	0.65	0.49	0.35	0.39	0.6	0.79	0.88	0.92	(94)
------	------	------	------	------	------	------	------	-----	------	------	------	------

Useful gains, mGm , W

569.4	610.55	621.47	613.68	545.23	406.56	280	290.77	411.84	499.45	533.72	554.11	(95)
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Monthly average external temperature from Table U1

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

1114.98	1087.66	992.58	837.85	651.47	438.6	288.61	302.74	471.8	705.87	925.37	1107.11	(97)
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Space heating requirement for each month

405.91	320.62	276.1	161.4	79.04	0	0	0	0	153.57	281.99	411.43	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

405.91	320.62	276.1	161.4	79.04	0	0	0	0	153.57	281.99	411.43	(98c)
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Space heating requirement in kWh/m ² /year												24.3	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	439.77	347.37	299.14	174.87	85.64	0	0	0	0	166.38	305.51	445.75			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	85.29	85.05	84.58	83.66	82.27	79.8	79.8	79.8	79.8	83.52	84.75	85.34			(217)	
Fuel for water heating																
	273.39	242.37	258.97	230.74	227.73	211.92	209.58	217.82	220.08	234.02	244.64	270.34	2841.61		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													2264.43	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2841.61	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													213.75	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

16.18	24.43	37.57	45.28	51.52	49.08	48.48	44.42	37.75	29.23	18.35	13.81	416.09	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
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Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
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Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

4.81	10.41	21.29	32.87	44.36	44.91	44.39	37.17	26.7	15.18	6.5	3.78	292.37	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
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Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			4697.32	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		82.43	(240a)
Low-rate fraction	0		82.43	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		82.43	(241a)
Low-rate fraction	0		82.43	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		82.43	(242a)

Low-rate fraction	0	82.43	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	103.43	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	35.25	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-84.94	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	242.34	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.67	(257)
SAP rating	89.2	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			475.53	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			596.74	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		1072.27	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		30.85	(268)
energy saved or generated	0	-91.99	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		1023.06	(272)
Dwelling CO ₂ Emission Rate		11.9	(273)
EI rating		90	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			2558.8	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			3211.02	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			5769.82	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			327.85	(282)
energy saved or generated	0		-755.11	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5472.66	(286)
Dwelling PE Rate			63.64	(287)

Dwelling Reference: 410
Dwelling Type: New Dwelling Design Stage
410
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.31		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	10.25	896.56	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													78.84	(31)
Party Wall								0					0	(32)
Party floor													2000	(32a)
Party ceiling													1500	(32b)
Internal wall **													729	(33c)
Internal floor													0	(32d)
Internal ceiling floor													0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$													26.86	(33)
Heat capacity Cm = $\sum(A \times k)$													5125.56	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.51	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													3.94	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													3.94	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													30.8	(37)
Ventilation heat loss calculated monthly														
	11.05	10.91	10.78	10.09	9.96	9.27	9.27	9.14	9.55	9.96	10.23	10.5		(38)
Heat transfer coefficient, W/K														
	41.85	41.71	41.58	40.89	40.76	40.07	40.07	39.94	40.35	40.76	41.03	41.3		(39)
Heat loss parameter (HLP), W/m ² K														
	0.84	0.83	0.83	0.82	0.82	0.8	0.8	0.8	0.81	0.82	0.82	0.83		(40)
Number of days in month (Table 1a)														
	31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
214.83 190.09 202.01 177.6 172.19 155.17 153.07 159.08 160.77 179.27 190.64 212.47 2167.18		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
92.48 82.22 88.22 79.42 78.3 71.96 71.94 73.94 73.82 80.65 83.76 91.69		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.26 82.22 74.26 76.74 74.26 76.74 74.26 74.26 76.74 74.26 76.74 74.26 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23 148.76 144.91 136.72 126.37 116.64 110.15 108.62 112.47 120.67 131.01 140.74 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 (71)

Water heating gains (Table 5)

124.3 122.35 118.57 110.31 105.24 99.95 96.7 99.39 102.53 108.41 116.33 123.25 (72)

Total internal gains

397.15 404.68 389.1 375.11 357.23 341.68 329.46 330.62 340.09 354.69 375.43 389.6 (73)

6. Solar gains

Solar gains in watts, calculated for each month

119.3 201.43 274.56 344.49 394.15 396.12 379.81 341.25 298.13 221.99 142.48 102.42 (83)

Total gains – internal and solar (watts)

516.46 606.11 663.66 719.6 751.38 737.8 709.27 671.87 638.23 576.67 517.92 492.01 (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, $\eta_{1,m}$ (see Table 9a)

0.87 0.8 0.73 0.61 0.48 0.34 0.25 0.27 0.42 0.64 0.8 0.88 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.87 20.17 20.46 20.75 20.91 20.98 20.99 20.99 20.95 20.75 20.3 19.82 (87)

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

20.22 20.22 20.23 20.24 20.24 20.25 20.25 20.25 20.25 20.24 20.24 20.23 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.85 0.79 0.71 0.58 0.44 0.3 0.21 0.23 0.38 0.61 0.78 0.87 (89)

Roof

Mean internal temperature in the rest of dwelling T2

18.92 19.28 19.63 19.98 20.15 20.23 20.25 20.25 20.21 19.99 19.46 18.86 (90)

Living area fraction

0.36 (91)

Mean internal temperature (for the whole dwelling)

19.26 19.61 19.94 20.26 20.43 20.51 20.52 20.52 20.48 20.27 19.77 19.21 (92)

Adjusted mean internal temperature:

19.11 19.46 19.79 20.11 20.28 20.36 20.37 20.37 20.33 20.12 19.62 19.06 (93)

8. Space heating requirement

Utilisation factor for gains,

0.83	0.77	0.69	0.58	0.45	0.31	0.21	0.23	0.38	0.6	0.76	0.84	(94)
------	------	------	------	------	------	------	------	------	-----	------	------	------

Useful gains, mGm , W

428.78	464.75	459.23	414.93	334.41	227.46	150.43	157.62	244.56	346.53	396.17	415.28	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

619.93	607.18	552.37	458.3	349.61	230.63	151.08	158.55	251.39	387.88	513.59	613.81	(97)
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Space heating requirement for each month

142.22	95.71	69.29	31.22	11.31	0	0	0	0	30.76	84.54	147.7	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

142.22	95.71	69.29	31.22	11.31	0	0	0	0	30.76	84.54	147.7	(98c)
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Space heating requirement in kWh/m ² /year												12.26	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)												(104)
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0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month							0					0	(107)
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0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,								0				0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
140.95 94.86 68.68 30.94 11.2 0 0 0 0 30.49 83.79 146.38			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
94.57 93.95 93.18 92.18 91.36 90.8 90.8 90.8 90.8 92.15 93.68 94.69			(217)
Fuel for water heating			
227.17 202.33 216.8 192.66 188.46 170.89 168.58 175.2 177.05 194.53 203.5 224.39		2341.57	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		607.29	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2341.57	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	107.06 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		193.06	(231)
Electricity for lighting		124.53	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3266.45	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		22.11 (240a)
Low-rate fraction	0		22.11 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		22.11 (241a)
Low-rate fraction	0		22.11 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		22.11 (242a)

Low-rate fraction	0	22.11	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	85.23	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	31.83	(249)
Energy For lighting	0	20.54	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	251.71	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.95	(257)
SAP rating	84.54	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			127.53	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			491.73	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		619.26	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		26.78	(267)
Electricity for lighting		17.97	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		664.01	(272)
Dwelling CO ₂ Emission Rate		13.28	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			686.24	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2645.98	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3332.21	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			292.05	(281)
Electricity for lighting			191.01	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3815.28	(286)
Dwelling PE Rate			76.31	(287)



TER WORKSHEET

Dwelling Reference: 410
Dwelling Type: New Dwelling Design Stage
410
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.4	0.4	(18)
Number of sides on which dwelling is sheltered		2	2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.34	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.34	0.37	0.39	0.4	4.51	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(24d)
Effective air change rate														
	0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25)
Effective air change rate from PCDB:														
	0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	11.68		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	11.94	928.76	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²														78.84	(31)
Party Wall														0	(32)
Party floor														2000	(32a)
Party ceiling														1500	(32b)
Internal wall **														729	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$														25.92	(33)
Heat capacity $C_m = \sum (A \times k)$														5157.76	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K														103.16	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K														3.94	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available														3.94	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$														29.86	(37)
Ventilation heat loss calculated monthly															
	25.56	25.4	25.24	24.51	24.37	23.73	23.73	23.61	23.98	24.37	24.65	24.94			(38)
Heat transfer coefficient, W/K															
	55.42	55.26	55.11	54.37	54.23	53.59	53.59	53.48	53.84	54.23	54.51	54.8			(39)
Heat loss parameter (HLP), W/m ² K															
	1.11	1.11	1.1	1.09	1.08	1.07	1.07	1.07	1.08	1.08	1.09	1.1			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N														1.69	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)															(42a)
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36			(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)															(42b)
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65			(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)															(42c)
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94			(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)														98.7	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$															
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94		1183	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)															
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44		1637.06	(45)
Distribution loss (46) = $0.15 \times (45)$															
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12			(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel														0	(47)
Water storage loss (or HIU loss)															
a) If manufacturer's declared loss factor is known (kWh/day):														1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
216.4 191.51 203.59 179.12 173.76 156.69 154.64 160.65 162.28 180.84 192.16 214.04 2185.67		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
24.03 21.25 22.25 18.42 17.17 14.69 13.77 14.65 15.2 17.92 20.3 23.58		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
192.38 170.26 181.33 160.69 156.59 142 140.87 146 147.08 162.91 171.86 190.46 1962.43		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
93.74 83.35 89.48 80.64 79.56 73.18 73.2 75.2 75.04 81.91 84.97 92.95		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.64 82.64 74.64 77.13 74.64 77.13 74.64 74.64 77.13 74.64 77.13 74.64 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23 148.76 144.91 136.72 126.37 116.64 110.15 108.62 112.47 120.67 131.01 140.74 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 (71)

Water heating gains (Table 5)

125.99 124.03 120.26 112 106.93 101.64 98.39 101.07 104.22 110.1 118.02 124.93 (72)

Total internal gains

399.22 406.79 391.17 377.19 359.29 343.76 331.53 332.69 342.17 356.75 377.51 391.66 (73)

6. Solar gains

Solar gains in watts, calculated for each month

89.44 151.01 205.84 258.26 295.49 296.97 284.74 255.83 223.51 166.42 106.82 76.78 (83)

Total gains – internal and solar (watts)

488.66 557.8 597.01 635.45 654.79 640.73 616.27 588.52 565.68 523.18 484.33 468.45 (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, $\eta_{1,m}$ (see Table 9a)

0.91 0.87 0.83 0.75 0.63 0.49 0.37 0.4 0.57 0.76 0.87 0.92 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.05 19.36 19.76 20.25 20.63 20.87 20.96 20.95 20.8 20.32 19.63 19 (87)

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

19.99 20 20 20.01 20.01 20.02 20.02 20.03 20.02 20.01 20.01 20 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.9 0.86 0.81 0.71 0.59 0.42 0.29 0.32 0.51 0.73 0.85 0.91 (89)

Roof

Mean internal temperature in the rest of dwelling T2

17.75 18.14 18.63 19.23 19.66 19.93 20 19.99 19.85 19.32 18.48 17.69 (90)

Living area fraction

0.36 (91)

Mean internal temperature (for the whole dwelling)

18.22 18.59 19.04 19.6 20.02 20.27 20.35 20.34 20.19 19.69 18.9 18.17 (92)

Adjusted mean internal temperature:

18.22 18.59 19.04 19.6 20.02 20.27 20.35 20.34 20.19 19.69 18.9 18.17 (93)

8. Space heating requirement

Utilisation factor for gains,

0.87	0.83	0.78	0.7	0.59	0.44	0.32	0.34	0.52	0.71	0.83	0.88	(94)
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Useful gains, mGm , W

425.45	463.79	467.58	445.18	384.52	282.59	194.83	202.83	293.26	372.41	400.69	412.23	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

771.4	756.33	691.11	581.66	451.02	303.91	200.91	210.73	328.14	492.83	643.22	765.4	(97)
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Space heating requirement for each month

257.38	196.58	166.3	98.26	49.48	0	0	0	0	89.59	174.62	262.76	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

257.38	196.58	166.3	98.26	49.48	0	0	0	0	89.59	174.62	262.76	(98c)
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Space heating requirement in kWh/m²/year

25.9

(99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(108)
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Space cooling requirement in kWh/m²/year

0

0

0

8f. Space heating requirement

Fabric Energy Efficiency,	0	0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)		
Space heating fuel (main heating system 1), kWh/month	0												0			
	278.85	212.98	180.17	106.46	53.61	0	0	0	0	97.07	189.19	284.69		(211)		
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(213)		
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(215)		
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	84.71	84.38	83.87	82.99	81.79	79.8	79.8	79.8	79.8	82.78	84.1	84.78		(217)		
Fuel for water heating																
	227.09	201.77	216.22	193.62	191.45	177.94	176.52	182.96	184.31	196.81	204.36	224.64	2377.71	(219)		
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0		(221)		
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													1403.02	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2377.71	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													125.17	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

9.55	14.5	22.44	27.23	31.16	29.77	29.42	26.88	22.71	17.44	10.87	8.14	250.13	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

2.65	5.75	11.78	18.21	24.58	24.87	24.57	20.56	14.76	8.38	3.59	2.08	161.77	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

	Fuel	kWh/year		
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energy saved			0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			3579.99	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.07	(240a)
Low-rate fraction	0		51.07	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.07	(241a)
Low-rate fraction	0		51.07	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.07	(242a)

Low-rate fraction	0	51.07	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	86.55	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	20.64	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-50.29	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	214.15	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.81	(257)
SAP rating	86.85	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			294.63	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			499.32	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		793.95	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		18.07	(268)
energy saved or generated	0	-53.51	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		770.43	(272)
Dwelling CO ₂ Emission Rate		15.41	(273)
EI rating		89	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1585.41	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2686.81	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4272.22	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			191.98	(282)
energy saved or generated	0		-447.36	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4146.94	(286)
Dwelling PE Rate			82.94	(287)

Dwelling Reference: 605
Dwelling Type: New Dwelling Design Stage
 605
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	60 (1a) x 2.6	(2a) =	156 (3a)
Total floor area TFA			60 (4)
Dwelling volume			156 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.31		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	4.98	435.4	(29a)
Roof	6	450	(30)

Total area of external elements $\sum A$, m ²														95.9	(31)
Party Wall								0						783	(32)
Party floor														2400	(32a)
Party ceiling														0	(32b)
Internal wall **														1069.2	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$														27.59	(33)
Heat capacity Cm = $\sum(A \times k)$														5137.6	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K														85.63	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K														4.8	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available														4.8	(36a)
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$														32.38	(37)
Ventilation heat loss calculated monthly															
	12.52	12.37	12.22	11.47	11.32	10.58	10.58	10.43	10.88	11.32	11.62	11.92			(38)
Heat transfer coefficient, W/K															
	44.9	44.76	44.61	43.86	43.71	42.96	42.96	42.81	43.26	43.71	44.01	44.31			(39)
Heat loss parameter (HLP), W/m ² K															
	0.75	0.75	0.74	0.73	0.73	0.72	0.72	0.71	0.72	0.73	0.73	0.74			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N													1.98	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.45	56.58	55.32	52.92	51.14	49.16	48.03	49.28	50.65	52.78	55.24	57.22	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	24.83	24.46	23.94	22.98	22.26	21.47	21.04	21.56	22.12	22.97	23.94	24.74	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	34.92	33.65	32.38	31.11	29.84	28.57	28.57	29.84	31.11	32.38	33.65	34.92	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													107.88	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	117.2	114.69	111.65	107.01	103.25	99.2	97.65	100.68	103.88	108.13	112.83	116.89	1293.07 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	185.61	163.32	171.6	146.49	138.99	121.98	118.1	124.67	128.1	146.73	160.75	183.02	1789.36 (45)	
Distribution loss (46) = 0.15 x (45)														
	27.84	24.5	25.74	21.97	20.85	18.3	17.71	18.7	19.21	22.01	24.11	27.45	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
230.63 203.99 216.62 190.07 184.02 165.55 163.12 169.69 171.67 191.75 204.33 228.05 2319.49		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
230.63 203.99 216.62 190.07 184.02 165.55 163.12 169.69 171.67 191.75 204.33 228.05 2319.49		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
97.73 86.84 93.08 83.57 82.23 75.42 75.29 77.47 77.45 84.81 88.31 96.87		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

87.23 96.58 87.23 90.14 87.23 90.14 87.23 87.23 90.14 87.23 90.14 87.23 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

172.95 174.74 170.22 160.59 148.44 137.02 129.38 127.59 132.11 141.74 153.89 165.32 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.91 32.91 32.91 32.91 32.91 32.91 32.91 32.91 32.91 32.91 32.91 32.91 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 -79.27 (71)

Water heating gains (Table 5)

131.36 129.22 125.1 116.07 110.53 104.75 101.19 104.13 107.57 113.99 122.65 130.21 (72)

Total internal gains

447.27 456.27 438.28 422.52 401.92 384.63 370.53 371.67 382.55 398.69 422.41 438.48 (73)

6. Solar gains

Solar gains in watts, calculated for each month

81.66 159.75 263.09 383.7 470.24 481.37 458.29 393.66 305.98 189.56 101.83 67.16 (83)

Total gains – internal and solar (watts)

528.93 616.02 701.37 806.22 872.16 866 828.82 765.34 688.53 588.24 524.23 505.64 (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, η_1 , m (see Table 9a)

0.87 0.81 0.73 0.59 0.44 0.31 0.23 0.25 0.42 0.66 0.81 0.88 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.73 20.04 20.4 20.74 20.91 20.98 20.99 20.99 20.95 20.69 20.18 19.68 (87)

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

20.3 20.3 20.3 20.31 20.32 20.33 20.33 20.33 20.32 20.32 20.31 20.31 (88)

Roof

Utilisation factor for gains for rest of dwelling, η_2 , m (see Table 9a)

0.86 0.8 0.71 0.56 0.41 0.28 0.19 0.22 0.38 0.63 0.8 0.87 (89)

Roof

Mean internal temperature in the rest of dwelling T2

18.81 19.19 19.62 20.04 20.23 20.31 20.32 20.32 20.28 20 19.39 18.76 (90)

Living area fraction

0.24 (91)

Mean internal temperature (for the whole dwelling)

19.03 19.39 19.81 20.21 20.39 20.47 20.49 20.49 20.44 20.17 19.58 18.98 (92)

Adjusted mean internal temperature:

18.88 19.24 19.66 20.06 20.24 20.32 20.34 20.34 20.29 20.02 19.43 18.83 (93)

8. Space heating requirement

Utilisation factor for gains,

0.83	0.77	0.69	0.55	0.41	0.28	0.19	0.22	0.38	0.61	0.77	0.84	(94)
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Useful gains, mGm , W

439.61	476.19	481.84	444.24	358.61	242.73	159.85	167.49	259.59	360.26	405.04	426.54	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

654.84	641.95	587.12	489.41	373.48	245.82	160.51	168.5	267.71	411.52	542.6	648.39	(97)
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Space heating requirement for each month

160.13	111.39	78.33	32.52	11.06	0	0	0	0	38.14	99.04	165.06	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

160.13	111.39	78.33	32.52	11.06	0	0	0	0	38.14	99.04	165.06	(98c)
--------	--------	-------	-------	-------	---	---	---	---	-------	-------	--------	-------

Space heating requirement in kWh/m ² /year												11.59	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100.9	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	158.7	110.4	77.63	32.23	10.96	0	0	0	0	37.8	98.16	163.58		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												90.8	(216)	
Efficiency of water heater															
	94.68	94.13	93.28	92.15	91.32	90.8	90.8	90.8	90.8	92.33	93.87	94.78		(217)	
Fuel for water heating															
	243.58	216.71	232.23	206.26	201.51	182.33	179.65	186.88	189.06	207.68	217.68	240.6	2504.17	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													689.47	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													2504.17	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	130.85	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													41	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													216.85	(231)	
Electricity for lighting													146.28	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	3556.77	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		25.1 (240a)
Low-rate fraction	0		25.1 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		25.1 (241a)
Low-rate fraction	0		25.1 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		25.1 (242a)

Low-rate fraction	0	25.1	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	91.15	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	35.76	(249)
Energy For lighting	0	24.12	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	268.13	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.92	(257)
SAP rating	85.1	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			144.79	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			525.88	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		670.67	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		30.08	(267)
Electricity for lighting		21.11	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		721.86	(272)
Dwelling CO ₂ Emission Rate		12.03	(273)
EI rating		91	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			779.1	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2829.71	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			3608.82	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			328.04	(281)
Electricity for lighting			224.37	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4161.23	(286)
Dwelling PE Rate			69.35	(287)

Dwelling Reference: 605
Dwelling Type: New Dwelling Design Stage
605
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	60 (1a) x 2.6	(2a) =	156 (3a)
Total floor area TFA			60 (4)
Dwelling volume			156 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.13	0.13	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.38	0.38	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.29	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.37	0.37	0.36	0.32	0.32	0.28	0.28	0.27	0.29	0.32	0.33	0.34	3.85	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(24d)
Effective air change rate														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)
Effective air change rate from PCDB:														
	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.31		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	5.6	435.4	(29a)
Roof	5.5	450	(30)

Total area of external elements ΣA , m ²														95.9	(31)
Party Wall								0						783	(32)
Party floor														2400	(32a)
Party ceiling														0	(32b)
Internal wall **														1069.2	(33c)
Internal floor														0	(32d)
Internal ceiling floor														0	(32e)
Fabric heat loss, W/K = $\Sigma (A \times U)$														27.71	(33)
Heat capacity Cm = $\Sigma(A \times k)$														5137.6	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K														85.63	(35)
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K														4.8	(36)
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available														4.8	(36a)
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$														32.51	(37)
Ventilation heat loss calculated monthly															
	29.33	29.2	29.06	28.42	28.3	27.74	27.74	27.63	27.95	28.3	28.54	28.79			(38)
Heat transfer coefficient, W/K															
	61.84	61.7	61.56	60.92	60.8	60.24	60.24	60.14	60.46	60.8	61.04	61.3			(39)
Heat loss parameter (HLP), W/m²K															
	1.03	1.03	1.03	1.02	1.01	1	1	1	1.01	1.01	1.02	1.02			(40)
Number of days in month (Table 1a)															
	31	28	31	30	31	30	31	31	30	31	30	31			(41)

4. Water heating energy requirement

Assumed occupancy, N													1.98	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.45	56.58	55.32	52.92	51.14	49.16	48.03	49.28	50.65	52.78	55.24	57.22		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	24.83	24.46	23.94	22.98	22.26	21.47	21.04	21.56	22.12	22.97	23.94	24.74		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	34.92	33.65	32.38	31.11	29.84	28.57	28.57	29.84	31.11	32.38	33.65	34.92		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													107.88	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	117.2	114.69	111.65	107.01	103.25	99.2	97.65	100.68	103.88	108.13	112.83	116.89	1293.07	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	185.61	163.32	171.6	146.49	138.99	121.98	118.1	124.67	128.1	146.73	160.75	183.02	1789.36	(45)
Distribution loss (46) = 0.15 x (45)														
	27.84	24.5	25.74	21.97	20.85	18.3	17.71	18.7	19.21	22.01	24.11	27.45		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
232.2 205.41 218.19 191.59 185.59 167.07 164.69 171.26 173.19 193.33 205.85 229.62 2337.98		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
26.26 23.23 24.32 20.14 18.77 16.06 15.05 16.01 16.62 19.59 22.19 25.78		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
205.94 182.18 193.87 171.45 166.82 151.01 149.64 155.25 156.57 173.74 183.65 203.84 2093.97		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
98.99 87.97 94.33 84.78 83.49 76.63 76.54 78.73 78.67 86.06 89.52 98.13		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

87.52	96.9	87.52	90.44	87.52	90.44	87.52	87.52	90.44	87.52	90.44	87.52	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

172.95	174.74	170.22	160.59	148.44	137.02	129.38	127.59	132.11	141.74	153.89	165.32	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	(69)
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Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	(71)
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Water heating gains (Table 5)

133.05	130.91	126.79	117.75	112.22	106.43	102.88	105.82	109.26	115.68	124.34	131.9	(72)
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Total internal gains

449.25	458.28	440.26	424.51	403.9	386.61	372.51	373.65	384.53	400.66	424.4	440.46	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

75.03	146.77	241.71	352.52	432.03	442.26	421.05	361.68	281.12	174.16	93.55	61.7	(83)
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Total gains – internal and solar (watts)

524.27	605.05	681.97	777.03	835.94	828.88	793.56	735.33	665.66	574.82	517.95	502.16	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.9	0.87	0.81	0.7	0.57	0.43	0.32	0.36	0.54	0.75	0.87	0.91	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.82	19.17	19.66	20.24	20.65	20.88	20.96	20.94	20.77	20.22	19.43	18.76	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.06	20.06	20.06	20.07	20.07	20.08	20.08	20.08	20.08	20.07	20.07	20.07	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.89	0.85	0.79	0.67	0.53	0.38	0.26	0.29	0.48	0.72	0.85	0.9	(89)
------	------	------	------	------	------	------	------	------	------	------	-----	------

Roof

Mean internal temperature in the rest of dwelling T2

17.52	17.96	18.57	19.27	19.73	19.98	20.05	20.05	19.88	19.26	18.3	17.46	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	------

Living area fraction

												0.24	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

17.84	18.25	18.83	19.5	19.96	20.2	20.27	20.26	20.1	19.49	18.58	17.77	(92)
-------	-------	-------	------	-------	------	-------	-------	------	-------	-------	-------	------

Adjusted mean internal temperature:

17.84	18.25	18.83	19.5	19.96	20.2	20.27	20.26	20.1	19.49	18.58	17.77	(93)
-------	-------	-------	------	-------	------	-------	-------	------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.86	0.82	0.76	0.65	0.52	0.38	0.27	0.3	0.49	0.7	0.82	0.87	(94)
------	------	------	------	------	------	------	-----	------	-----	------	------	------

Useful gains, mGm , W

450.47	494.78	515.1	505.19	437.27	316.9	215.37	224.13	323.63	400.67	423.31	436.33	(95)
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Monthly average external temperature from Table U1

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

837.3	823.84	759.22	646.01	502.01	337.42	221.36	232.39	362.68	540.55	700.68	832.04	(97)
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Space heating requirement for each month

287.8	221.13	181.63	101.39	48.16	0	0	0	0	104.07	199.7	294.4	(98a)
-------	--------	--------	--------	-------	---	---	---	---	--------	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

287.8	221.13	181.63	101.39	48.16	0	0	0	0	104.07	199.7	294.4	(98c)
-------	--------	--------	--------	-------	---	---	---	---	--------	-------	-------	-------

Space heating requirement in kWh/m ² /year												23.97	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	311.81	239.58	196.78	109.85	52.18	0	0	0	0	112.76	216.36	318.96			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	84.81	84.5	83.91	82.92	81.65	79.8	79.8	79.8	79.8	82.95	84.25	84.88			(217)	
Fuel for water heating																
	242.83	215.61	231.04	206.75	204.3	189.24	187.52	194.55	196.21	209.45	217.99	240.15	2535.63		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													1558.29	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2535.63	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													146.77	(232)		

Low-rate fraction	0	56.72	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	92.3	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	24.2	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-60	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	219.4	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.75	(257)
SAP rating	87.81	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			327.24	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			532.48	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		859.72	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		21.18	(268)
energy saved or generated	0	-64.2	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		828.63	(272)
Dwelling CO ₂ Emission Rate		13.81	(273)
EI rating		89	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1760.86	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2865.26	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4626.12	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			225.12	(282)
energy saved or generated	0		-533.86	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4447.48	(286)
Dwelling PE Rate			74.12	(287)

Dwelling Reference: 606
Dwelling Type: New Dwelling Design Stage
 606
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	54 (1a) x 2.6	(2a) =	140.4 (3a)
Total floor area TFA			54 (4)
Dwelling volume			140.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	37.21		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	6.74	590.1	(29a)
Roof	6.48	486	(30)

Total area of external elements $\sum A$, m ²													130.95	(31)											
Party Wall													0	210.6	(32)										
Party floor													2160	(32a)											
Party ceiling													0	(32b)											
Internal wall **													972	(33c)											
Internal floor													0	(32d)											
Internal ceiling floor													0	(32e)											
Fabric heat loss, W/K = $\sum (A \times U)$													52.74	(33)											
Heat capacity Cm = $\sum(A \times k)$													4418.7	(34)											
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													81.83	(35)											
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													6.55	(36)											
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													6.55	(36a)											
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													59.29	(37)											
Ventilation heat loss calculated monthly																									
													11.27	11.13	11	10.33	10.19	9.52	9.52	9.38	9.79	10.19	10.46	10.73	(38)
Heat transfer coefficient, W/K																									
													70.55	70.42	70.28	69.61	69.48	68.8	68.8	68.67	69.07	69.48	69.75	70.02	(39)
Heat loss parameter (HLP), W/m ² K																									
													1.31	1.3	1.3	1.29	1.29	1.27	1.27	1.27	1.28	1.29	1.29	1.3	(40)
Number of days in month (Table 1a)																									
													31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N													1.81	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	54.53	53.71	52.52	50.24	48.55	46.67	45.6	46.78	48.08	50.1	52.44	54.32	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	23.57	23.22	22.73	21.82	21.14	20.39	19.98	20.47	21	21.81	22.74	23.49	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	33.15	31.94	30.74	29.53	28.32	27.12	27.12	28.32	29.53	30.74	31.94	33.15	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													102.41	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	111.25	108.88	105.99	101.59	98.02	94.17	92.7	95.58	98.62	102.65	107.11	110.97	1227.52 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	176.2	155.04	162.9	139.07	131.95	115.8	112.11	118.35	121.6	139.29	152.6	173.75	1698.65 (45)	
Distribution loss (46) = 0.15 x (45)														
	26.43	23.26	24.43	20.86	19.79	17.37	16.82	17.75	18.24	20.89	22.89	26.06	(46)	
Storage volume (litres) including any solar or WWHRs storage within same vessel													0	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													1.3	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.7	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.7	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
21.76 19.66 21.76 21.06 21.76 21.06 21.76 21.76 21.06 21.76 21.06 21.76		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
221.22 195.71 207.92 182.64 176.97 159.37 157.13 163.37 165.17 184.32 196.18 218.77	2228.78	(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
221.22 195.71 207.92 182.64 176.97 159.37 157.13 163.37 165.17 184.32 196.18 218.77	2228.78	(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
94.61 84.09 90.18 81.1 79.89 73.36 73.3 75.37 75.29 82.33 85.6 93.79		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts													
90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4													(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

79.49 88.01 79.49 82.14 79.49 82.14 79.49 79.49 82.14 79.49 82.14 79.49 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

157.6 159.24 155.12 146.35 135.27 124.86 117.91 116.27 120.39 129.17 140.24 150.65 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.04 32.04 32.04 32.04 32.04 32.04 32.04 32.04 32.04 32.04 32.04 32.04 (69)

Pumps and fans gains (Table 5a)

3 3 3 3 3 0 0 0 0 3 3 3 (70)

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

-72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 -72.32 (71)

Water heating gains (Table 5)

127.16 125.13 121.21 112.64 107.38 101.89 98.52 101.3 104.57 110.66 118.89 126.06 (72)

Total internal gains

417.38 425.5 408.95 394.24 375.27 359.01 346.04 347.19 357.23 372.44 394.39 409.33 (73)

6. Solar gains

Solar gains in watts, calculated for each month

193.6 377.73 624.28 921.08 1142.84 1177.17 1117.66 949.86 728.88 448.37 241.11 159.46 (83)

Total gains – internal and solar (watts)

610.98 803.23 1033.22 1315.33 1518.1 1536.19 1463.69 1297.05 1086.11 820.81 635.5 568.78 (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, $\eta_{1,m}$ (see Table 9a)

0.87 0.79 0.68 0.53 0.38 0.27 0.2 0.24 0.39 0.64 0.81 0.88 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.41 19.01 19.73 20.39 20.75 20.92 20.97 20.96 20.81 20.21 19.18 18.29 (87)

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

19.84 19.84 19.84 19.85 19.85 19.86 19.86 19.86 19.86 19.85 19.85 19.84 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.85 0.77 0.65 0.49 0.34 0.23 0.15 0.18 0.34 0.6 0.79 0.87 (89)

Roof

Mean internal temperature in the rest of dwelling T2

16.89 17.62 18.48 19.24 19.63 19.8 19.84 19.84 19.71 19.07 17.86 16.75 (90)

Living area fraction

0.25 (91)

Mean internal temperature (for the whole dwelling)

17.27 17.97 18.79 19.53 19.91 20.08 20.13 20.12 19.98 19.35 18.19 17.14 (92)

Adjusted mean internal temperature:

17.12 17.82 18.64 19.38 19.76 19.93 19.98 19.97 19.83 19.2 18.04 16.99 (93)

8. Space heating requirement

Utilisation factor for gains,

0.8	0.73	0.62	0.47	0.34	0.23	0.16	0.18	0.34	0.57	0.74	0.82	(94)
-----	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

491.39	582.43	637.05	622.83	517.87	354.4	228.79	239.82	366.98	469.55	473.35	467.08	(95)
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

904.49	909.58	853.31	729.23	559.89	366.66	232.27	245	395.88	597.84	762.92	895.36	(97)
--------	--------	--------	--------	--------	--------	--------	-----	--------	--------	--------	--------	------

Space heating requirement for each month

307.35	219.84	160.9	76.61	31.27	0	0	0	0	95.44	208.49	318.64	(98a)
--------	--------	-------	-------	-------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

307.35	219.84	160.9	76.61	31.27	0	0	0	0	95.44	208.49	318.64	(98c)
--------	--------	-------	-------	-------	---	---	---	---	-------	--------	--------	-------

Space heating requirement in kWh/m ² /year												26.27	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,

												0	(109)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100.9	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
304.61 217.88 159.46 75.93 30.99 0 0 0 0 94.59 206.63 315.8			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	90.8	(216)
Efficiency of water heater			
96.41 95.88 94.95 93.57 92.19 90.8 90.8 90.8 90.8 94.01 95.74 96.53			(217)
Fuel for water heating			
229.46 204.13 218.99 195.2 191.97 175.52 173.06 179.92 181.91 196.06 204.91 226.64		2377.75	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		1405.89	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		2377.75	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	115.62 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		45	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		201.62	(231)
Electricity for lighting		133.3	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	4118.57	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.17 (240a)
Low-rate fraction	0		51.17 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.17 (241a)
Low-rate fraction	0		51.17 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		51.17 (242a)

Low-rate fraction	0	51.17	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	86.55	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	33.25	(249)
Energy For lighting	0	21.98	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	284.95	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	1.04	(257)
SAP rating	83.2	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			295.24	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			499.33	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		794.57	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		27.97	(267)
Electricity for lighting		19.24	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		841.77	(272)
Dwelling CO ₂ Emission Rate		15.59	(273)
EI rating		89	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			1588.66	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2686.86	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4275.52	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			305.01	(281)
Electricity for lighting			204.46	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4784.99	(286)
Dwelling PE Rate			88.61	(287)

Dwelling Reference: 606
 Dwelling Type: New Dwelling Design Stage
 606
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	54 (1a) x 2.6	(2a) =	140.4 (3a)
Total floor area TFA			54 (4)
Dwelling volume			140.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	2	x 10 =	20	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
Air changes per hour				
Number of storeys in the dwelling (ns)		0.14	0.14	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		5	5	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.39	0.39	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.3	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.39	0.38	0.37	0.33	0.33	0.29	0.29	0.28	0.3	0.33	0.34	0.36	3.99	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(24d)
Effective air change rate														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)
Effective air change rate from PCDB:														
	0.58	0.57	0.57	0.56	0.55	0.54	0.54	0.54	0.55	0.55	0.56	0.56		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	12.84		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	11.42	888.16	(29a)
Roof	5.94	486	(30)

Total area of external elements $\sum A$, m ²		130.95	(31)
Party Wall	0	210.6	(32)
Party floor		2160	(32a)
Party ceiling		0	(32b)
Internal wall **		972	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		32.5	(33)
Heat capacity $C_m = \sum (A \times k)$		4716.76	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		87.35	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		6.55	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		6.55	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		39.04	(37)
Ventilation heat loss calculated monthly			
	26.65 26.51 26.38 25.76 25.64 25.1 25.1 25 25.31 25.64 25.88 26.12		(38)
Heat transfer coefficient, W/K			
	65.69 65.56 65.42 64.8 64.69 64.14 64.14 64.04 64.35 64.69 64.92 65.17		(39)
Heat loss parameter (HLP), W/m ² K			
	1.22 1.21 1.21 1.2 1.2 1.19 1.19 1.19 1.19 1.2 1.2 1.21		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		1.81	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	54.53 53.71 52.52 50.24 48.55 46.67 45.6 46.78 48.08 50.1 52.44 54.32		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	23.57 23.22 22.73 21.82 21.14 20.39 19.98 20.47 21 21.81 22.74 23.49		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	33.15 31.94 30.74 29.53 28.32 27.12 27.12 28.32 29.53 30.74 31.94 33.15		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		102.41	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	111.25 108.88 105.99 101.59 98.02 94.17 92.7 95.58 98.62 102.65 107.11 110.97	1227.52	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	176.2 155.04 162.9 139.07 131.95 115.8 112.11 118.35 121.6 139.29 152.6 173.75	1698.65	(45)
Distribution loss (46) = $0.15 \times (45)$			
	26.43 23.26 24.43 20.86 19.79 17.37 16.82 17.75 18.24 20.89 22.89 26.06		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		0	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		1.39	(48)

Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.75	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.75	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 22.58 23.33		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
222.79 197.13 209.49 184.16 178.54 160.89 158.71 164.94 166.69 185.89 197.7 220.34 2247.27		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
24.93 22.05 23.09 19.12 17.82 15.25 14.29 15.2 15.77 18.6 21.07 24.47		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
197.86 175.08 186.4 165.04 160.72 145.64 144.41 149.74 150.92 167.29 176.63 195.87 2015.63		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
95.86 85.22 91.44 82.31 81.15 74.58 74.55 76.63 76.51 83.59 86.81 95.05		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts													
90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4													(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

79.78	88.33	79.78	82.44	79.78	82.44	79.78	79.78	82.44	79.78	82.44	79.78	(67)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

157.6	159.24	155.12	146.35	135.27	124.86	117.91	116.27	120.39	129.17	140.24	150.65	(68)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	(71)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Water heating gains (Table 5)

128.85	126.82	122.9	114.32	109.07	103.58	100.21	102.99	106.26	112.35	120.58	127.75	(72)
--------	--------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Total internal gains

419.35	427.5	410.92	396.23	377.24	361	348.01	349.16	359.21	374.42	396.38	411.3	(73)
--------	-------	--------	--------	--------	-----	--------	--------	--------	--------	--------	-------	------

6. Solar gains

Solar gains in watts, calculated for each month

61.37	119.73	197.88	291.95	362.23	373.11	354.25	301.07	231.04	142.12	76.43	50.54	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	------

Total gains – internal and solar (watts)

480.72	547.24	608.8	688.18	739.47	734.11	702.26	650.24	590.25	516.54	472.8	461.85	(84)
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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, $\eta_{1,m}$ (see Table 9a)

0.91	0.88	0.84	0.75	0.63	0.49	0.37	0.41	0.6	0.79	0.88	0.92	(86)
------	------	------	------	------	------	------	------	-----	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.37	18.72	19.24	19.91	20.44	20.78	20.92	20.89	20.63	19.93	19.05	18.32	(87)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

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

19.91	19.91	19.91	19.92	19.92	19.93	19.93	19.93	19.93	19.92	19.92	19.91	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.9	0.87	0.81	0.71	0.58	0.42	0.29	0.33	0.53	0.75	0.86	0.91	(89)
-----	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

16.88	17.3	17.96	18.77	19.39	19.76	19.88	19.87	19.62	18.82	17.74	16.81	(90)
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.25	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

17.25	17.66	18.28	19.06	19.65	20.02	20.14	20.12	19.87	19.1	18.07	17.19	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

Adjusted mean internal temperature:

17.25	17.66	18.28	19.06	19.65	20.02	20.14	20.12	19.87	19.1	18.07	17.19	(93)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.86 0.83 0.78 0.69 0.57 0.43 0.31 0.34 0.53 0.72 0.83 0.87 (94)

Useful gains, mGm, W

415.7 454.27 473.35 471.81 419.65 313.44 216.21 223.84 312.8 373.48 391.3 403.25 (95)

Monthly average external temperature from Table U1

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

850.79 836.26 770.53 658.29 514.55 347.48 227.15 238.43 371.35 549.73 712.14 846.31 (97)

Space heating requirement for each month

323.71 256.7 221.11 134.27 70.6 0 0 0 0 131.13 231.01 329.63 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

323.71 256.7 221.11 134.27 70.6 0 0 0 0 131.13 231.01 329.63 (98c)

Space heating requirement in kWh/m²/year

31.45 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													92.3	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	350.72	278.12	239.55	145.47	76.49	0	0	0	0	142.07	250.28	357.13			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												79.8	(216)		
Efficiency of water heater																
	85.16	84.92	84.44	83.6	82.35	79.8	79.8	79.8	79.8	83.52	84.66	85.22			(217)	
Fuel for water heating																
	232.35	206.18	220.74	197.42	195.18	182.51	180.97	187.65	189.12	200.3	208.63	229.85	2430.9		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													1839.82	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													2430.9	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	0	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													41	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													86	(231)		
Electricity for lighting													133.78	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

10.3	15.62	24.15	29.28	33.49	31.98	31.61	28.88	24.42	18.78	11.71	8.78	269.01	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

2.88	6.25	12.8	19.79	26.71	27.03	26.7	22.35	16.05	9.11	3.9	2.26	175.84	(233b)
------	------	------	-------	-------	-------	------	-------	-------	------	-----	------	--------	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

energy saved	Fuel	kWh/year	0	(236a)
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energy used			0	(237a)
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Total delivered energy for all uses			4045.65	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.97	(240a)
Low-rate fraction	0		66.97	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.97	(241a)
Low-rate fraction	0		66.97	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.97	(242a)

Low-rate fraction	0	66.97	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	88.48	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	14.18	(249)
Energy For lighting	0	22.06	(250)
Additional standing charges	0	92	(251)
Energy saving/generation technologies	0	-54.18	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	229.51	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.83	(257)
SAP rating	86.47	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			386.36	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			510.49	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		896.85	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		19.31	(268)
energy saved or generated	0	-57.79	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		870.3	(272)
Dwelling CO ₂ Emission Rate		16.12	(273)
EI rating		88	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			2078.99	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2746.91	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			4825.91	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			205.2	(282)
energy saved or generated	0		-482.01	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			4679.2	(286)
Dwelling PE Rate			86.65	(287)

Dwelling Reference: 105
Dwelling Type: New Dwelling Design Stage
105
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	69 (1a) x 2.6	(2a) =	179.4 (3a)
Total floor area TFA			69 (4)
Dwelling volume			179.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	8.28	5175	(28b)
Basement wall	0	0	(29)
External wall	5.75	503.16	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²													119.76	(31)													
Party Wall													0	1063.8	(32)												
Party floor													0	(32a)													
Party ceiling													2070	(32b)													
Internal wall **													1083.78	(33c)													
Internal floor													0	(32d)													
Internal ceiling floor													0	(32e)													
Fabric heat loss, W/K = $\Sigma (A \times U)$													30.67	(33)													
Heat capacity Cm = $\Sigma(A \times k)$													9895.74	(34)													
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													143.42	(35)													
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K													5.99	(36)													
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available													5.99	(36a)													
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$													36.65	(37)													
Ventilation heat loss calculated monthly																											
													14.4	14.23	14.05	13.19	13.02	12.16	12.16	11.99	12.51	13.02	13.37	13.71	(38)		
Heat transfer coefficient, W/K																											(39)
													51.05	50.88	50.71	49.85	49.68	48.82	48.82	48.64	49.16	49.68	50.02	50.37	(39)		
Heat loss parameter (HLP), W/m ² K																											(40)
													0.74	0.74	0.73	0.72	0.72	0.71	0.71	0.7	0.71	0.72	0.72	0.73	(40)		
Number of days in month (Table 1a)																											(41)
													31	28	31	30	31	30	31	31	30	31	30	31	(41)		

4. Water heating energy requirement

Assumed occupancy, N													2.22	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	61.47	60.54	59.2	56.62	54.72	52.6	51.4	52.73	54.2	56.47	59.11	61.23	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	26.56	26.16	25.61	24.58	23.82	22.97	22.51	23.06	23.66	24.57	25.61	26.47	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	37.38	36.02	34.66	33.3	31.94	30.58	30.58	31.94	33.3	34.66	36.02	37.38	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													115.44	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	125.41	122.73	119.47	114.51	110.48	106.15	104.49	107.74	111.16	115.71	120.74	125.08	1383.67 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	198.61	174.76	183.62	156.76	148.73	130.53	126.37	133.4	137.07	157.01	172.02	195.85	1914.73 (45)	
Distribution loss (46) = 0.15 x (45)														
	29.79	26.21	27.54	23.51	22.31	19.58	18.96	20.01	20.56	23.55	25.8	29.38	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
225.57 199.11 210.57 182.84 175.68 156.61 153.32 160.35 163.15 183.96 198.1 222.8	2232.07	(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
225.57 199.11 210.57 182.84 175.68 156.61 153.32 160.35 163.15 183.96 198.1 222.8	2232.07	(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
66.04 58.11 61.05 52.12 49.45 43.4 42.02 44.36 45.58 52.21 57.2 65.12		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08 111.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

98.69	109.27	98.69	101.98	98.69	101.98	98.69	98.69	101.98	98.69	101.98	98.69	(67)
-------	--------	-------	--------	-------	--------	-------	-------	--------	-------	--------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

194.95	196.97	191.88	181.02	167.32	154.45	145.85	143.82	148.92	159.77	173.47	186.35	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	34.11	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	-88.86	(71)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Water heating gains (Table 5)

88.76	86.47	82.06	72.39	66.47	60.28	56.48	59.62	63.3	70.17	79.44	87.53	(72)
-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	------

Total internal gains

438.73	449.04	428.96	411.72	388.81	373.04	357.34	358.46	370.53	384.96	411.22	428.89	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

81.79	160.01	263.51	384.31	470.99	482.14	459.02	394.29	306.47	189.86	101.99	67.26	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	------

Total gains – internal and solar (watts)

520.53	609.05	692.47	796.04	859.8	855.18	816.36	752.75	677	574.83	513.21	496.16	(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, $\eta_{1,m}$ (see Table 9a)

0.96	0.92	0.85	0.69	0.52	0.36	0.26	0.3	0.49	0.78	0.92	0.96	(86)
------	------	------	------	------	------	------	-----	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.06	20.31	20.6	20.87	20.97	21	21	21	20.98	20.81	20.41	20.02	(87)
-------	-------	------	-------	-------	----	----	----	-------	-------	-------	-------	------

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

20.31	20.31	20.31	20.32	20.32	20.33	20.33	20.34	20.33	20.32	20.32	20.31	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.95	0.91	0.83	0.67	0.49	0.33	0.22	0.25	0.45	0.75	0.91	0.96	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

19.21	19.52	19.88	20.19	20.29	20.33	20.33	20.34	20.32	20.14	19.66	19.17	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.18	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.36	19.66	20	20.3	20.41	20.45	20.45	20.45	20.43	20.26	19.79	19.32	(92)
-------	-------	----	------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.36	19.66	20	20.3	20.41	20.45	20.45	20.45	20.43	20.26	19.79	19.32	(93)
-------	-------	----	------	-------	-------	-------	-------	-------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.94	0.9	0.82	0.66	0.49	0.33	0.23	0.26	0.45	0.74	0.9	0.95	(94)
------	-----	------	------	------	------	------	------	------	------	-----	------	------

Useful gains, mGm , W

488.9	545.53	565.9	529.01	424.05	284.42	187.84	196.86	307.01	426.83	461.11	470.14	(95)
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Monthly average external temperature from Table U1

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

768.96	751.14	684.74	568.53	432.83	285.46	187.97	197.11	311.34	479.72	634.75	761.55	(97)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

208.36	138.17	88.42	28.45	6.53	0	0	0	0	39.35	125.02	216.81	(98a)
--------	--------	-------	-------	------	---	---	---	---	-------	--------	--------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

208.36	138.17	88.42	28.45	6.53	0	0	0	0	39.35	125.02	216.81	(98c)
--------	--------	-------	-------	------	---	---	---	---	-------	--------	--------	-------

Space heating requirement in kWh/m ² /year												12.34	(99)
---	--	--	--	--	--	--	--	--	--	--	--	-------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

Intermittency factor												0	(105)
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0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	208.36	138.17	88.42	28.45	6.53	0	0	0	0	39.35	125.02	216.81		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												344.58	(216)	
Efficiency of water heater															
	344.58	344.58	344.58	344.58	344.58	344.58	344.58	344.58	344.58	344.58	344.58	344.58		(217)	
Fuel for water heating															
	65.46	57.78	61.11	53.06	50.98	45.45	44.49	46.53	47.35	53.39	57.49	64.66	647.76	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													851.13	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													647.76	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	147.74	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													0	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													147.74	(231)	
Electricity for lighting													165.5	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1812.12	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		140.35 (240a)
Low-rate fraction	0		140.35 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		140.35 (241a)
Low-rate fraction	0		140.35 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		140.35 (242a)

Low-rate fraction	0	140.35	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	24.36	(249)
Energy For lighting	0	27.29	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	192	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.61	(257)
SAP rating	90.17	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			134.1	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			91.44	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		20.49	(267)
Electricity for lighting		23.89	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		269.92	(272)
Dwelling CO ₂ Emission Rate		3.91	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1347.53	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			985.89	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			223.49	(281)
Electricity for lighting			253.85	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			2810.77	(286)
Dwelling PE Rate			40.74	(287)

Dwelling Reference: 401
Dwelling Type: New Dwelling Design Stage
 401
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	102 (1a) x 2.6	(2a) =	265.2 (3a)
Total floor area TFA			102 (4)
Dwelling volume			265.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	24.35		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	13.21	1155.56	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													106.11	(31)												
Party Wall													0	513	(32)											
Party floor													4080	(32a)												
Party ceiling													3060	(32b)												
Internal wall **													1603.8	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\sum (A \times U)$													39.86	(33)												
Heat capacity Cm = $\sum(A \times k)$													10412.36	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.08	(35)												
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													5.31	(36)												
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													5.31	(36a)												
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													45.17	(37)												
Ventilation heat loss calculated monthly																										
													22.54	22.26	21.98	20.59	20.31	18.91	18.91	18.64	19.47	20.31	20.87	21.43	(38)	
Heat transfer coefficient, W/K																										
													67.71	67.43	67.15	65.76	65.48	64.08	64.08	63.8	64.64	65.48	66.03	66.59	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.66	0.66	0.66	0.64	0.64	0.63	0.63	0.63	0.63	0.64	0.65	0.65	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													2.76	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	70.45	69.39	67.85	64.9	62.72	60.29	58.91	60.44	62.12	64.73	67.74	70.18		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	30.42	29.97	29.33	28.16	27.28	26.31	25.78	26.41	27.1	28.14	29.34	30.32		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	42.87	41.31	39.75	38.19	36.63	35.07	35.07	36.63	38.19	39.75	41.31	42.87		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													132.31	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	143.74	140.67	136.93	131.25	126.63	121.67	119.76	123.48	127.41	132.62	138.39	143.36	1585.9	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	227.64	200.31	210.46	179.67	170.47	149.61	144.84	152.9	157.11	179.96	197.16	224.47	2194.6	(45)
Distribution loss (46) = 0.15 x (45)														
	34.15	30.05	31.57	26.95	25.57	22.44	21.73	22.93	23.57	26.99	29.57	33.67		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
254.6 224.65 237.41 205.75 197.42 175.69 171.79 179.85 183.19 206.91 223.24 251.43 2511.93		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
254.6 224.65 237.41 205.75 197.42 175.69 171.79 179.85 183.19 206.91 223.24 251.43 2511.93		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
75.69 66.6 69.98 59.74 56.68 49.74 48.16 50.84 52.24 59.84 65.56 74.64		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86 137.86		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

130.9 144.92 130.9 135.26 130.9 135.26 130.9 130.9 135.26 130.9 135.26 130.9 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

259.52 262.21 255.43 240.98 222.74 205.6 194.15 191.46 198.25 212.69 230.93 248.07 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 36.79 (69)

Pumps and fans gains (Table 5a)

0 0 0 0 0 0 0 0 0 0 0 0 (70)

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

-110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 -110.29 (71)

Water heating gains (Table 5)

101.74 99.11 94.05 82.97 76.18 69.09 64.73 68.33 72.55 80.43 91.05 100.32 (72)

Total internal gains

556.52 570.61 544.74 523.57 494.19 474.31 454.14 455.05 470.42 488.38 521.6 543.65 (73)

6. Solar gains

Solar gains in watts, calculated for each month

138.96 271.83 447.67 652.9 800.16 819.11 779.82 669.86 520.66 322.56 173.27 114.27 (83)

Total gains – internal and solar (watts)

695.47 842.44 992.41 1176.48 1294.34 1293.42 1233.96 1124.9 991.08 810.93 694.87 657.92 (84)

7. Mean internal temperature (heating season)

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

21 (85)

Utilisation factor for gains for living area, α_1 , m (see Table 9a)

0.93 0.88 0.79 0.62 0.46 0.31 0.23 0.26 0.44 0.72 0.89 0.94 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.86 20.19 20.54 20.85 20.96 20.99 21 21 20.98 20.77 20.29 19.82 (87)

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

20.37 20.38 20.38 20.39 20.39 20.4 20.4 20.41 20.4 20.39 20.39 20.38 (88)

Roof

Utilisation factor for gains for rest of dwelling, α_2 , m (see Table 9a)

0.93 0.87 0.77 0.6 0.43 0.29 0.2 0.23 0.4 0.7 0.88 0.94 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.03 19.43 19.86 20.23 20.35 20.4 20.4 20.41 20.38 20.16 19.57 18.98 (90)

Living area fraction

0.21 (91)

Mean internal temperature (for the whole dwelling)

19.2 19.59 20.01 20.36 20.48 20.53 20.53 20.53 20.51 20.29 19.72 19.15 (92)

Adjusted mean internal temperature:

19.2 19.59 20.01 20.36 20.48 20.53 20.53 20.53 20.51 20.29 19.72 19.15 (93)

8. Space heating requirement

Utilisation factor for gains,

0.91	0.85	0.76	0.6	0.43	0.29	0.2	0.23	0.41	0.69	0.86	0.92	(94)
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Useful gains, mGm , W

633.69	718.7	751.81	700.6	561.78	377.74	251.51	263.01	406.47	559.73	599.08	606.78	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

1009.06	990.54	907.08	753.43	575.04	379.71	251.86	263.6	414.02	634.25	833.47	995.83	(97)
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Space heating requirement for each month

279.27	182.68	115.52	38.04	9.86	0	0	0	0	55.44	168.76	289.45	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

279.27	182.68	115.52	38.04	9.86	0	0	0	0	55.44	168.76	289.45	(98c)
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Space heating requirement in kWh/m ² /year												11.17	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m ² /year												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	279.27	182.68	115.52	38.04	9.86	0	0	0	0	55.44	168.76	289.45		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												339.24	(216)	
Efficiency of water heater															
	339.24	339.24	339.24	339.24	339.24	339.24	339.24	339.24	339.24	339.24	339.24	339.24		(217)	
Fuel for water heating															
	75.05	66.22	69.98	60.65	58.19	51.79	50.64	53.02	54	60.99	65.81	74.11	740.45	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													1139.03	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													740.45	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	222.44	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													0	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													222.44	(231)	
Electricity for lighting													219.5	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	2321.43	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		187.83 (240a)
Low-rate fraction	0		187.83 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		187.83 (241a)
Low-rate fraction	0		187.83 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		187.83 (242a)

Low-rate fraction	0	187.83	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	36.68	(249)
Energy For lighting	0	36.2	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	260.7	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.64	(257)
SAP rating	89.65	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			179.37	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			104.56	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		30.85	(267)
Electricity for lighting		31.68	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		346.47	(272)
Dwelling CO ₂ Emission Rate		3.4	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO ₂ /year	
Space heating - main system 1			1803.01	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1127.11	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			336.5	(281)
Electricity for lighting			336.68	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3603.3	(286)
Dwelling PE Rate			35.33	(287)

Dwelling Reference: 402
Dwelling Type: New Dwelling Design Stage
402
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	58 (1a) x 2.6	(2a) =	150.8 (3a)
Total floor area TFA			58 (4)
Dwelling volume			150.8 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.32	290.92	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²												32.67	(31)	
Party Wall												0	1069.2	(32)
Party floor												2320	(32a)	
Party ceiling												1740	(32b)	
Internal wall **												1069.2	(33c)	
Internal floor												0	(32d)	
Internal ceiling floor												0	(32e)	
Fabric heat loss, W/K = $\sum (A \times U)$												16.58	(33)	
Heat capacity Cm = $\sum(A \times k)$												6489.32	(34)	
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K												111.88	(35)	
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K												1.63	(36)	
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available												1.63	(36a)	
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$												18.21	(37)	
Ventilation heat loss calculated monthly														
12.1 11.96 11.81 11.09 10.95 10.22 10.22 10.08 10.51 10.95 11.24 11.53													(38)	
Heat transfer coefficient, W/K														
30.31 30.17 30.02 29.3 29.16 28.43 28.43 28.29 28.72 29.16 29.45 29.74													(39)	
Heat loss parameter (HLP), W/m ² K														
0.52 0.52 0.52 0.51 0.5 0.49 0.49 0.49 0.5 0.5 0.51 0.51													(40)	
Number of days in month (Table 1a)														
31 28 31 30 31 30 31 31 30 31 30 31													(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.92	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	56.49	55.64	54.4	52.04	50.29	48.34	47.23	48.46	49.81	51.9	54.32	56.27	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	24.41	24.05	23.54	22.6	21.9	21.11	20.69	21.2	21.75	22.59	23.55	24.33	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	34.34	33.09	31.84	30.59	29.34	28.1	28.1	29.34	30.59	31.84	33.09	34.34	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													106.08	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	115.24	112.78	109.79	105.23	101.53	97.55	96.02	99	102.15	106.33	110.95	114.94	1271.52 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	182.52	160.6	168.74	144.05	136.68	119.95	116.13	122.59	125.96	144.29	158.08	179.97	1759.55 (45)	
Distribution loss (46) = 0.15 x (45)														
	27.38	24.09	25.31	21.61	20.5	17.99	17.42	18.39	18.89	21.64	23.71	27	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
209.47 184.94 195.69 170.14 163.63 146.03 143.08 149.54 152.04 171.24 184.16 206.93 2076.88		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
209.47 184.94 195.69 170.14 163.63 146.03 143.08 149.54 152.04 171.24 184.16 206.93 2076.88		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
60.69 53.4 56.1 47.9 45.45 39.88 38.61 40.76 41.88 47.97 52.56 59.84		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23 96.23		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

86.12 95.34 86.12 88.99 86.12 88.99 86.12 86.12 88.99 86.12 88.99 86.12 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

167.88 169.62 165.23 155.88 144.09 133 125.59 123.85 128.24 137.58 149.38 160.47 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 32.62 (69)

Pumps and fans gains (Table 5a)

0 0 0 0 0 0 0 0 0 0 0 0 (70)

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

-76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 -76.98 (71)

Water heating gains (Table 5)

81.57 79.46 75.41 66.52 61.08 55.39 51.9 54.79 58.17 64.48 73 80.43 (72)

Total internal gains

387.43 396.29 378.62 363.26 343.15 329.25 315.48 316.62 327.27 340.05 363.24 378.89 (73)

6. Solar gains

Solar gains in watts, calculated for each month

61.35 120.01 197.63 288.24 353.24 361.61 344.27 295.72 229.86 142.4 76.49 50.45 (83)

Total gains – internal and solar (watts)

448.78 516.3 576.26 651.5 696.4 690.86 659.74 612.34 557.12 482.45 439.73 429.33 (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, $\eta_{1,m}$ (see Table 9a)

0.88 0.81 0.7 0.53 0.39 0.26 0.19 0.21 0.35 0.61 0.8 0.89 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.54 20.71 20.87 20.97 20.99 21 21 21 21 20.95 20.77 20.52 (87)

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

20.5 20.5 20.5 20.52 20.52 20.53 20.53 20.53 20.53 20.52 20.51 20.51 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.87 0.79 0.68 0.51 0.37 0.24 0.17 0.19 0.33 0.58 0.79 0.88 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.96 20.18 20.36 20.48 20.51 20.53 20.53 20.53 20.52 20.47 20.26 19.94 (90)

Living area fraction

0.37 (91)

Mean internal temperature (for the whole dwelling)

20.18 20.38 20.55 20.67 20.69 20.71 20.71 20.71 20.7 20.65 20.45 20.16 (92)

Adjusted mean internal temperature:

20.18 20.38 20.55 20.67 20.69 20.71 20.71 20.71 20.7 20.65 20.45 20.16 (93)

8. Space heating requirement

Utilisation factor for gains,

0.86 0.79 0.68 0.52 0.37 0.25 0.18 0.2 0.34 0.59 0.79 0.87 (94)

Useful gains, mGm, W

385.98 407.07 393.76 338.3 261.11 173.5 116.73 121.82 189.12 283.68 345.35 374.91 (95)

Monthly average external temperature from Table U1

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

481.32 466.94 421.81 344.74 262.21 173.59 116.74 121.84 189.59 293.08 393.04 474.5 (97)

Space heating requirement for each month

70.93 40.24 20.87 4.64 0.82 0 0 0 0 7 34.34 74.09 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

70.93 40.24 20.87 4.64 0.82 0 0 0 0 7 34.34 74.09 (98c)

Space heating requirement in kWh/m²/year

4.36 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
70.93 40.24 20.87 4.64 0.82 0 0 0 0 7 34.34 74.09			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	347.55	(216)
Efficiency of water heater			
347.55 347.55 347.55 347.55 347.55 347.55 347.55 347.55 347.55 347.55 347.55 347.55			(217)
Fuel for water heating			
60.27 53.21 56.31 48.95 47.08 42.02 41.17 43.03 43.75 49.27 52.99 59.54		597.58	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		252.92	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		597.58	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	124.18 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		0	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		124.18	(231)
Electricity for lighting		144.41	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1119.1	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.71 (240a)
Low-rate fraction	0		41.71 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.71 (241a)
Low-rate fraction	0		41.71 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		41.71 (242a)

Low-rate fraction	0	41.71	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	20.48	(249)
Energy For lighting	0	23.81	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	86	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.3	(257)
SAP rating	95.13	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			40.18	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			84.34	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		17.23	(267)
Electricity for lighting		20.84	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		162.59	(272)
Dwelling CO ₂ Emission Rate		2.8	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			401.63	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			909.46	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			187.87	(281)
Electricity for lighting			221.5	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			1720.45	(286)
Dwelling PE Rate			29.66	(287)

Dwelling Reference: 403
Dwelling Type: New Dwelling Design Stage
 403
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	84 (1a) x 2.6	(2a) =	218.4 (3a)
Total floor area TFA			84 (4)
Dwelling volume			218.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	17.92		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	2.5	218.4	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													33.75	(31)													
Party Wall													0	1285.2	(32)												
Party floor													3360	(32a)													
Party ceiling													2520	(32b)													
Internal wall **													1215	(33c)													
Internal floor													0	(32d)													
Internal ceiling floor													0	(32e)													
Fabric heat loss, W/K = $\sum (A \times U)$													22.92	(33)													
Heat capacity Cm = $\sum(A \times k)$													8598.6	(34)													
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													102.36	(35)													
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.69	(36)													
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.69	(36a)													
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													24.6	(37)													
Ventilation heat loss calculated monthly																											
													17.53	17.32	17.11	16.06	15.85	14.81	14.81	14.6	15.23	15.85	16.27	16.69	(38)		
Heat transfer coefficient, W/K																											
													42.13	41.92	41.71	40.67	40.46	39.41	39.41	39.2	39.83	40.46	40.88	41.29	(39)		
Heat loss parameter (HLP), W/m ² K																											
													0.5	0.5	0.5	0.48	0.48	0.47	0.47	0.47	0.47	0.48	0.49	0.49	(40)		
Number of days in month (Table 1a)																											
													31	28	31	30	31	30	31	31	30	31	30	31	(41)		

4. Water heating energy requirement

Assumed occupancy, N													2.53	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	66.71	65.71	64.25	61.45	59.39	57.09	55.78	57.23	58.82	61.29	64.15	66.46		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	28.81	28.38	27.78	26.67	25.84	24.92	24.42	25.02	25.67	26.65	27.79	28.71		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	40.58	39.11	37.63	36.16	34.68	33.21	33.21	34.68	36.16	37.63	39.11	40.58		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													125.29	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	136.11	133.2	129.66	124.28	119.91	115.21	113.41	116.93	120.65	125.58	131.05	135.76	1501.75	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	215.56	189.68	199.29	170.14	161.42	141.67	137.16	144.79	148.77	170.41	186.7	212.56	2078.15	(45)
Distribution loss (46) = 0.15 x (45)														
	32.33	28.45	29.89	25.52	24.21	21.25	20.57	21.72	22.32	25.56	28	31.88		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
242.52 214.02 226.24 196.22 188.38 167.75 164.11 171.74 174.85 197.36 212.78 239.51 2395.48		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
242.52 214.02 226.24 196.22 188.38 167.75 164.11 171.74 174.85 197.36 212.78 239.51 2395.48		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
71.68 63.07 66.26 56.57 53.67 47.1 45.6 48.14 49.47 56.66 62.08 70.68		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72 126.72		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

115.01	127.33	115.01	118.84	115.01	118.84	115.01	115.01	118.84	115.01	118.84	115.01	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

227.6	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
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Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
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Water heating gains (Table 5)

96.34	93.85	89.06	78.57	72.14	65.42	61.3	64.71	68.7	76.16	86.22	95	(72)
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Total internal gains

499.96	512.16	489.1	469.76	443.51	425.59	407.59	408.64	422.42	438.71	468.6	488.58	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

102.24	200.01	329.39	480.39	588.74	602.68	573.78	492.87	383.09	237.33	127.49	84.08	(83)
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Total gains – internal and solar (watts)

602.2	712.17	818.48	950.16	1032.25	1028.27	981.37	901.5	805.51	676.04	596.09	572.66	(84)
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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C)	21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.88	0.8	0.68	0.51	0.36	0.25	0.18	0.2	0.34	0.6	0.81	0.9	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.47	20.69	20.86	20.97	20.99	21	21	21	21	20.95	20.74	20.45	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.52	20.52	20.52	20.54	20.54	20.55	20.55	20.55	20.54	20.54	20.53	20.53	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)												
0.87	0.79	0.67	0.49	0.35	0.23	0.16	0.18	0.32	0.58	0.79	0.89	(89)

Roof

Mean internal temperature in the rest of dwelling T2												
19.9	20.16	20.37	20.5	20.53	20.55	20.55	20.55	20.54	20.49	20.23	19.87	(90)

Living area fraction

Mean internal temperature (for the whole dwelling)												
19.99	20.24	20.45	20.58	20.6	20.62	20.62	20.62	20.61	20.56	20.31	19.96	(92)

Adjusted mean internal temperature:

19.99	20.24	20.45	20.58	20.6	20.62	20.62	20.62	20.61	20.56	20.31	19.96	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.86 0.78 0.66 0.49 0.35 0.23 0.16 0.18 0.32 0.58 0.79 0.88 (94)

Useful gains, mGm, W

519.79 557.52 544.14 466.85 358.94 237.08 158.37 165.43 258.78 389.58 469.07 502.61 (95)

Monthly average external temperature from Table U1

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

661.08 643.17 581.8 474.84 360.24 237.19 158.38 165.46 259.39 402.84 540.02 650.93 (97)

Space heating requirement for each month

105.11 57.56 28.03 5.75 0.97 0 0 0 0 9.86 51.08 110.35 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

105.11 57.56 28.03 5.75 0.97 0 0 0 0 9.86 51.08 110.35 (98c)

Space heating requirement in kWh/m²/year

4.39 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
105.11 57.56 28.03 5.75 0.97 0 0 0 0 9.86 51.08 110.35			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	341.46	(216)
Efficiency of water heater			
341.46 341.46 341.46 341.46 341.46 341.46 341.46 341.46 341.46 341.46 341.46 341.46			(217)
Fuel for water heating			
71.02 62.68 66.26 57.46 55.17 49.13 48.06 50.29 51.21 57.8 62.31 70.14		701.53	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		368.7	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		701.53	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	179.85 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		0	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		179.85	(231)
Electricity for lighting		192.86	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
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Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1442.95	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		60.8	(240a)
Low-rate fraction	0		60.8	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		60.8	(241a)
Low-rate fraction	0		60.8	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		60.8	(242a)

Low-rate fraction	0	60.8	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	29.66	(249)
Energy For lighting	0	31.8	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	122.26	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.34	(257)
SAP rating	94.47	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			58.62	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			99.06	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		24.95	(267)
Electricity for lighting		27.84	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		210.46	(272)
Dwelling CO2 Emission Rate		2.51	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO2/year	
Space heating - main system 1			585.68	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1067.81	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			272.08	(281)
Electricity for lighting			295.81	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			2221.38	(286)
Dwelling PE Rate			26.44	(287)

Dwelling Reference: 404
Dwelling Type: New Dwelling Design Stage
404
30-48 Lawrence Road
London
N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	52 (1a) x 2.6	(2a) =	135.2 (3a)
Total floor area TFA			52 (4)
Dwelling volume			135.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.5		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	1.47	128.38	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²												21.06	(31)												
Party Wall												0	1458	(32)											
Party floor												2080	(32a)												
Party ceiling												1560	(32b)												
Internal wall **												972	(33c)												
Internal floor												0	(32d)												
Internal ceiling floor												0	(32e)												
Fabric heat loss, W/K = $\Sigma (A \times U)$												14.72	(33)												
Heat capacity Cm = $\Sigma(A \times k)$												6198.38	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K												119.2	(35)												
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K												1.05	(36)												
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available												1.05	(36a)												
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$												15.77	(37)												
Ventilation heat loss calculated monthly																									
												10.85	10.72	10.59	9.94	9.81	9.17	9.17	9.04	9.43	9.81	10.07	10.33	(38)	
Heat transfer coefficient, W/K																									(39)
												26.62	26.49	26.36	25.72	25.59	24.94	24.94	24.81	25.2	25.59	25.85	26.1	(39)	
Heat loss parameter (HLP), W/m ² K																									(40)
												0.51	0.51	0.51	0.49	0.49	0.48	0.48	0.48	0.48	0.49	0.5	0.5	(40)	
Number of days in month (Table 1a)																									(41)
												31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.75	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	53.55	52.74	51.57	49.32	47.67	45.82	44.77	45.94	47.21	49.2	51.49	53.34	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	23.15	22.81	22.32	21.43	20.76	20.02	19.62	20.1	20.62	21.42	22.33	23.07	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	32.54	31.36	30.18	28.99	27.81	26.63	26.63	27.81	28.99	30.18	31.36	32.54	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													100.56	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	109.24	106.91	104.07	99.75	96.24	92.47	91.02	93.85	96.83	100.79	105.17	108.95	1205.27 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	173.01	152.23	159.94	136.55	129.56	113.7	110.08	116.2	119.4	136.77	149.84	170.6	1667.86 (45)	
Distribution loss (46) = 0.15 x (45)														
	25.95	22.83	23.99	20.48	19.43	17.05	16.51	17.43	17.91	20.52	22.48	25.59	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
199.96 176.58 186.9 162.63 156.51 139.78 137.03 143.15 145.48 163.72 175.92 197.55 1985.19		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
199.96 176.58 186.9 162.63 156.51 139.78 137.03 143.15 145.48 163.72 175.92 197.55 1985.19		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
57.52 50.62 53.18 45.4 43.08 37.81 36.6 38.64 39.7 45.48 49.82 56.72		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45 87.45		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

77.2	85.47	77.2	79.77	77.2	79.77	77.2	77.2	79.77	77.2	79.77	77.2	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

152.43	154.01	150.02	141.54	130.83	120.76	114.03	112.45	116.44	124.92	135.63	145.7	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	(69)
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Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	-69.96	(71)
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Water heating gains (Table 5)

77.32	75.32	71.48	63.06	57.9	52.51	49.19	51.93	55.14	61.12	69.2	76.24	(72)
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Total internal gains

356.17	364.03	347.93	333.6	315.16	302.27	289.66	290.81	300.58	312.48	333.83	348.37	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

61.35	120.01	197.63	288.24	353.24	361.61	344.27	295.72	229.86	142.4	76.49	50.45	(83)
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Total gains – internal and solar (watts)

417.52	484.04	545.57	621.84	668.4	663.88	633.92	586.53	530.44	454.87	410.33	398.82	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.87	0.78	0.67	0.49	0.36	0.24	0.17	0.19	0.33	0.57	0.78	0.88	(86)
------	------	------	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.64	20.79	20.92	20.98	21	21	21	21	21	20.97	20.83	20.62	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.51	20.51	20.51	20.53	20.53	20.54	20.54	20.54	20.54	20.53	20.52	20.52	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.86	0.77	0.65	0.48	0.34	0.22	0.15	0.18	0.31	0.55	0.77	0.87	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

20.09	20.28	20.42	20.51	20.53	20.54	20.54	20.54	20.53	20.5	20.34	20.07	(90)
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Living area fraction

												0.24	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

20.22	20.4	20.54	20.62	20.64	20.65	20.65	20.65	20.64	20.61	20.46	20.2	(92)
-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	------

Adjusted mean internal temperature:

20.22	20.4	20.54	20.62	20.64	20.65	20.65	20.65	20.64	20.61	20.46	20.2	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.85	0.77	0.65	0.48	0.34	0.23	0.16	0.18	0.31	0.55	0.76	0.86	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

353.98	370.63	353.85	298.44	228.26	150.8	100.96	105.43	164.72	251.28	313.34	343.99	(95)
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Monthly average external temperature from Table U1

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)
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Heat loss rate for mean internal temperature

423.84	410.69	370.15	301.44	228.68	150.83	100.96	105.44	164.89	256.2	345.2	417.71	(97)
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Space heating requirement for each month

51.98	26.92	12.13	2.16	0.31	0	0	0	0	3.66	22.94	54.85	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

51.98	26.92	12.13	2.16	0.31	0	0	0	0	3.66	22.94	54.85	(98c)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m²/year

3.36 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

0	0	0	0	0	0	0	0	0	0	0	0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	51.98	26.92	12.13	2.16	0.31	0	0	0	0	3.66	22.94	54.85		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												349.3	(216)	
Efficiency of water heater															
	349.3	349.3	349.3	349.3	349.3	349.3	349.3	349.3	349.3	349.3	349.3	349.3		(217)	
Fuel for water heating															
	57.25	50.55	53.51	46.56	44.81	40.02	39.23	40.98	41.65	46.87	50.36	56.56	568.34	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													174.95	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													568.34	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	111.34	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													0	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													111.34	(231)	
Electricity for lighting													129.45	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	984.07	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		28.85 (240a)
Low-rate fraction	0		28.85 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		28.85 (241a)
Low-rate fraction	0		28.85 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		28.85 (242a)

Low-rate fraction	0	28.85	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	18.36	(249)
Energy For lighting	0	21.35	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	68.55	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.25	(257)
SAP rating	95.88	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			27.89	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			80.2	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		15.44	(267)
Electricity for lighting		18.68	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		142.22	(272)
Dwelling CO ₂ Emission Rate		2.73	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			278.16	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			864.91	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			168.43	(281)
Electricity for lighting			198.55	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			1510.06	(286)
Dwelling PE Rate			29.04	(287)

Dwelling Reference: 405
 Dwelling Type: New Dwelling Design Stage
 405
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	61 (1a) x 2.6	(2a) =	158.6 (3a)
Total floor area TFA			61 (4)
Dwelling volume			158.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.34		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	5.06	442.68	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													46.44	(31)											
Party Wall													0	1085.4	(32)										
Party floor													2440	(32a)											
Party ceiling													1830	(32b)											
Internal wall **													1069.2	(33c)											
Internal floor													0	(32d)											
Internal ceiling floor													0	(32e)											
Fabric heat loss, W/K = $\sum (A \times U)$													21.7	(33)											
Heat capacity Cm = $\sum(A \times k)$													6867.28	(34)											
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													112.58	(35)											
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													2.32	(36)											
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													2.32	(36a)											
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													24.02	(37)											
Ventilation heat loss calculated monthly																									
													12.73	12.58	12.43	11.66	11.51	10.75	10.75	10.6	11.06	11.51	11.82	12.12	(38)
Heat transfer coefficient, W/K																									
													36.75	36.59	36.44	35.68	35.53	34.77	34.77	34.62	35.07	35.53	35.83	36.14	(39)
Heat loss parameter (HLP), W/m ² K																									
													0.6	0.6	0.6	0.58	0.58	0.57	0.57	0.57	0.57	0.58	0.59	0.59	(40)
Number of days in month (Table 1a)																									
													31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N													2.01	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.92	57.05	55.78	53.35	51.56	49.56	48.43	49.69	51.07	53.21	55.69	57.69	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	25.03	24.66	24.13	23.17	22.45	21.64	21.21	21.73	22.3	23.16	24.14	24.94	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	35.21	33.93	32.65	31.37	30.09	28.81	28.81	30.09	31.37	32.65	33.93	35.21	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													108.77	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	118.16	115.64	112.56	107.89	104.1	100.02	98.45	101.51	104.74	109.02	113.76	117.85	1303.69 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	187.13	164.66	173.01	147.7	140.13	122.98	119.07	125.69	129.15	147.94	162.07	184.53	1804.06 (45)	
Distribution loss (46) = 0.15 x (45)														
	28.07	24.7	25.95	22.15	21.02	18.45	17.86	18.85	19.37	22.19	24.31	27.68	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
214.08 189.01 199.96 173.78 167.09 149.07 146.02 152.64 155.23 174.89 188.16 211.48 2121.39		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
214.08 189.01 199.96 173.78 167.09 149.07 146.02 152.64 155.23 174.89 188.16 211.48 2121.39		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
62.22 54.75 57.52 49.11 46.59 40.89 39.59 41.79 42.94 49.19 53.89 61.36		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49 100.49		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

88.5	97.98	88.5	91.45	88.5	91.45	88.5	88.5	91.45	88.5	91.45	88.5	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

175.46	177.28	172.69	162.93	150.6	139.01	131.27	129.45	134.03	143.8	156.13	167.72	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	(69)
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Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	-80.39	(71)
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Water heating gains (Table 5)

83.63	81.47	77.32	68.21	62.63	56.79	53.21	56.17	59.64	66.11	74.85	82.47	(72)
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Total internal gains

400.74	409.89	391.66	375.73	354.87	340.4	326.12	327.26	338.27	351.56	375.57	391.83	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

81.79	160.01	263.51	384.31	470.99	482.14	459.02	394.29	306.47	189.86	101.99	67.26	(83)
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Total gains – internal and solar (watts)

482.53	569.89	655.17	760.05	825.86	822.54	785.15	721.56	644.75	541.42	477.56	459.1	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.9	0.83	0.72	0.55	0.4	0.27	0.19	0.22	0.37	0.64	0.84	0.91	(86)
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Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.32	20.56	20.79	20.94	20.99	21	21	21	20.99	20.91	20.63	20.29	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.43	20.43	20.43	20.44	20.45	20.46	20.46	20.46	20.45	20.45	20.44	20.44	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.89	0.82	0.7	0.53	0.37	0.25	0.17	0.19	0.34	0.61	0.82	0.9	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

19.64	19.93	20.2	20.39	20.44	20.46	20.46	20.46	20.45	20.36	20.02	19.6	(90)
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Living area fraction

												0.2	(91)
--	--	--	--	--	--	--	--	--	--	--	--	-----	------

Mean internal temperature (for the whole dwelling)

19.78	20.06	20.32	20.5	20.55	20.57	20.57	20.57	20.56	20.47	20.14	19.74	(92)
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Adjusted mean internal temperature:

19.78	20.06	20.32	20.5	20.55	20.57	20.57	20.57	20.56	20.47	20.14	19.74	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.88 0.81 0.7 0.53 0.38 0.25 0.18 0.2 0.35 0.61 0.81 0.89 (94)

Useful gains, mGm, W

423.22 459.41 456.76 401.67 311.97 207.16 137.87 144.22 225.32 332.08 387.22 408.86 (95)

Monthly average external temperature from Table U1

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

568.68 554.69 503.52 413.84 314.32 207.41 137.91 144.29 226.49 350.62 467.37 561.54 (97)

Space heating requirement for each month

108.22 64.03 34.79 8.76 1.74 0 0 0 0 13.79 57.71 113.59 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

108.22 64.03 34.79 8.76 1.74 0 0 0 0 13.79 57.71 113.59 (98c)

Space heating requirement in kWh/m²/year

6.6 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	108.22	64.03	34.79	8.76	1.74	0	0	0	0	13.79	57.71	113.59	(211)		
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0	(213)		
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0	(215)		
Output from water heater),	0												346.7	(216)	
Efficiency of water heater															
	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	(217)		
Fuel for water heating															
	61.75	54.52	57.67	50.12	48.19	43	42.12	44.03	44.77	50.44	54.27	61	611.89	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0	(221)		
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													402.64	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													611.89	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	130.61	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													0	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													130.61	(231)	
Electricity for lighting													148.41	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1293.54	
-------------------------------------	---------	--

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.4 (240a)
Low-rate fraction	0		66.4 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.4 (241a)
Low-rate fraction	0		66.4 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		66.4 (242a)

Low-rate fraction	0	66.4	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	21.54	(249)
Energy For lighting	0	24.47	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	112.4	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.38	(257)
SAP rating	93.81	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			63.8	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			86.37	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		18.12	(267)
Electricity for lighting		21.42	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		189.7	(272)
Dwelling CO ₂ Emission Rate		3.11	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			638.77	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			931.25	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			197.58	(281)
Electricity for lighting			227.63	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			1995.24	(286)
Dwelling PE Rate			32.71	(287)

Dwelling Reference: 406
Dwelling Type: New Dwelling Design Stage
 406
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	4.65	407.12	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													40.77	(31)												
Party Wall													0	1198.8	(32)											
Party floor													2000	(32a)												
Party ceiling													1500	(32b)												
Internal wall **													729	(33c)												
Internal floor													0	(32d)												
Internal ceiling floor													0	(32e)												
Fabric heat loss, W/K = $\sum (A \times U)$													17.7	(33)												
Heat capacity Cm = $\sum(A \times k)$													5834.92	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													116.7	(35)												
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													2.04	(36)												
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													2.04	(36a)												
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													19.74	(37)												
Ventilation heat loss calculated monthly																										
													10.43	10.31	10.18	9.56	9.44	8.81	8.81	8.69	9.06	9.44	9.69	9.94	(38)	
Heat transfer coefficient, W/K																										
													30.18	30.05	29.93	29.3	29.18	28.56	28.56	28.43	28.81	29.18	29.43	29.68	(39)	
Heat loss parameter (HLP), W/m ² K																										
													0.6	0.6	0.6	0.59	0.58	0.57	0.57	0.57	0.58	0.58	0.59	0.59	(40)	
Number of days in month (Table 1a)																										
													31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) – Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
56.46 49.68 52.2 44.56 42.28 37.11 35.92 37.92 38.97 44.64 48.9 55.68		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.37 82.33 74.37 76.85 74.37 76.85 74.37 74.37 76.85 74.37 76.85 74.37 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23 148.76 144.91 136.72 126.37 116.64 110.15 108.62 112.47 120.67 131.01 140.74 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 31.45 (69)

Pumps and fans gains (Table 5a)

0 0 0 0 0 0 0 0 0 0 0 0 (70)

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

-67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 -67.6 (71)

Water heating gains (Table 5)

75.89 73.93 70.16 61.89 56.83 51.54 48.29 50.97 54.12 59.99 67.92 74.83 (72)

Total internal gains

345.84 353.38 337.79 323.81 305.92 293.38 281.15 282.31 291.79 303.38 324.13 338.29 (73)

6. Solar gains

Solar gains in watts, calculated for each month

89.57 159.72 233.3 306.93 355.1 356.17 341.97 306.36 259.32 180.92 108.69 75.69 (83)

Total gains – internal and solar (watts)

435.42 513.1 571.09 630.73 661.01 649.55 623.12 588.67 551.1 484.29 432.82 413.98 (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, $\eta_{1,m}$ (see Table 9a)

0.88 0.8 0.69 0.54 0.41 0.28 0.2 0.22 0.36 0.6 0.8 0.89 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.45 20.66 20.83 20.95 20.99 21 21 21 21 20.94 20.72 20.41 (87)

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

20.43 20.43 20.43 20.44 20.44 20.46 20.46 20.46 20.45 20.44 20.44 20.44 (88)

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.86 0.78 0.67 0.52 0.38 0.26 0.18 0.2 0.33 0.57 0.78 0.88 (89)

Roof

Mean internal temperature in the rest of dwelling T2

19.79 20.05 20.25 20.39 20.43 20.45 20.46 20.46 20.45 20.38 20.13 19.76 (90)

Living area fraction

0.36 (91)

Mean internal temperature (for the whole dwelling)

20.03 20.27 20.46 20.59 20.63 20.65 20.65 20.65 20.64 20.58 20.34 19.99 (92)

Adjusted mean internal temperature:

20.03 20.27 20.46 20.59 20.63 20.65 20.65 20.65 20.64 20.58 20.34 19.99 (93)

8. Space heating requirement

Utilisation factor for gains,

0.85	0.78	0.68	0.53	0.39	0.27	0.19	0.21	0.34	0.58	0.78	0.87	(94)
------	------	------	------	------	------	------	------	------	------	------	------	------

Useful gains, mGm , W

371.97	397.95	385.66	333.42	258.7	172.56	115.67	120.87	187.77	280.07	336.64	360.04	(95)
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Monthly average external temperature from Table U1

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

474.62	461.88	417.75	342.67	260.69	172.79	115.7	120.92	188.53	291.32	389.6	468.71	(97)
--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	-------	--------	------

Space heating requirement for each month

76.38	42.96	23.87	6.66	1.48	0	0	0	0	8.37	38.13	80.85	(98a)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

76.38	42.96	23.87	6.66	1.48	0	0	0	0	8.37	38.13	80.85	(98c)
-------	-------	-------	------	------	---	---	---	---	------	-------	-------	-------

Space heating requirement in kWh/m²/year

5.57 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0 (105)
--	--	--	--	--	--	--	--	--	--	--	--	---------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													100	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)		
Space heating fuel (main heating system 1), kWh/month	0												0			
	76.38	42.96	23.87	6.66	1.48	0	0	0	0	8.37	38.13	80.85		(211)		
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(213)		
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(215)		
Output from water heater),	0												349.41	(216)		
Efficiency of water heater																
	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41		(217)		
Fuel for water heating																
	56.31	49.73	52.64	45.82	44.11	39.4	38.64	40.36	41	46.13	49.56	55.64	559.34	(219)		
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0		(221)		
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													278.71	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													559.34	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	107.06	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													0	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													107.06	(231)		
Electricity for lighting													124.71	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1069.81	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		45.96 (240a)
Low-rate fraction	0		45.96 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		45.96 (241a)
Low-rate fraction	0		45.96 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		45.96 (242a)

Low-rate fraction	0	45.96	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	17.65	(249)
Energy For lighting	0	20.56	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	84.18	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.32	(257)
SAP rating	94.83	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			44.2	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			78.93	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		14.85	(267)
Electricity for lighting		18	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		155.98	(272)
Dwelling CO ₂ Emission Rate		3.12	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			442.31	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			851.2	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			161.95	(281)
Electricity for lighting			191.28	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			1646.74	(286)
Dwelling PE Rate			32.93	(287)

Dwelling Reference: 407
Dwelling Type: New Dwelling Design Stage
 407
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	10.75		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	3.14	274.82	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²													31.32	(31)
Party Wall													939.6	(32)
Party floor													2000	(32a)
Party ceiling													1500	(32b)
Internal wall **													729	(33c)
Internal floor													0	(32d)
Internal ceiling floor													0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$													16.19	(33)
Heat capacity $C_m = \sum (A \times k)$													5443.42	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K													108.87	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													1.57	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													1.57	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$													17.76	(37)
Ventilation heat loss calculated monthly														
	10.43	10.31	10.18	9.56	9.44	8.81	8.81	8.69	9.06	9.44	9.69	9.94		(38)
Heat transfer coefficient, W/K														
	28.19	28.07	27.94	27.32	27.2	26.57	26.57	26.45	26.82	27.2	27.44	27.69		(39)
Heat loss parameter (HLP), W/m ² K														
	0.56	0.56	0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(40)
Number of days in month (Table 1a)														
	31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)														(42a)
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)														(42b)
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)														(42c)
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = $0.15 \times (45)$														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) – Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
56.46 49.68 52.2 44.56 42.28 37.11 35.92 37.92 38.97 44.64 48.9 55.68		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.37	82.33	74.37	76.85	74.37	76.85	74.37	74.37	76.85	74.37	76.85	74.37	(67)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23	148.76	144.91	136.72	126.37	116.64	110.15	108.62	112.47	120.67	131.01	140.74	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	(71)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Water heating gains (Table 5)

75.89	73.93	70.16	61.89	56.83	51.54	48.29	50.97	54.12	59.99	67.92	74.83	(72)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Total internal gains

345.84	353.38	337.79	323.81	305.92	293.38	281.15	282.31	291.79	303.38	324.13	338.29	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

61.35	120.01	197.63	288.24	353.24	361.61	344.27	295.72	229.86	142.4	76.49	50.45	(83)
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Total gains – internal and solar (watts)

407.19	473.39	535.42	612.04	659.16	654.99	625.42	578.03	521.64	445.78	400.62	388.74	(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, $\eta_{1,m}$ (see Table 9a)

0.87	0.8	0.69	0.53	0.38	0.26	0.19	0.21	0.35	0.61	0.8	0.89	(86)
------	-----	------	------	------	------	------	------	------	------	-----	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

20.45	20.65	20.83	20.96	20.99	21	21	21	21	20.94	20.71	20.42	(87)
-------	-------	-------	-------	-------	----	----	----	----	-------	-------	-------	------

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

20.46	20.46	20.47	20.48	20.48	20.49	20.49	20.49	20.49	20.48	20.48	20.47	(88)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.86	0.79	0.67	0.51	0.36	0.24	0.17	0.19	0.33	0.58	0.79	0.88	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

19.82	20.07	20.28	20.43	20.47	20.49	20.49	20.49	20.48	20.42	20.15	19.8	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	------

Living area fraction

												0.36	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

20.05	20.28	20.48	20.62	20.66	20.67	20.67	20.68	20.67	20.6	20.35	20.02	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

Adjusted mean internal temperature:

20.05	20.28	20.48	20.62	20.66	20.67	20.67	20.68	20.67	20.6	20.35	20.02	(93)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.85	0.78	0.67	0.51	0.37	0.25	0.17	0.2	0.34	0.59	0.78	0.87	(94)
------	------	------	------	------	------	------	-----	------	------	------	------	------

Useful gains, mGm , W

347.83	369.85	360.88	312.76	242.23	161.25	108.26	113.06	175.5	261.01	313.19	337.46	(95)
--------	--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	------

Monthly average external temperature from Table U1

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

443.99	431.63	390.71	320.27	243.66	161.4	108.28	113.09	176.17	272.05	363.75	438.14	(97)
--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	--------	--------	------

Space heating requirement for each month

71.54	41.52	22.19	5.41	1.06	0	0	0	0	8.21	36.4	74.9	(98a)
-------	-------	-------	------	------	---	---	---	---	------	------	------	-------

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space heating requirement for each month after solar contribution

71.54	41.52	22.19	5.41	1.06	0	0	0	0	8.21	36.4	74.9	(98c)
-------	-------	-------	------	------	---	---	---	---	------	------	------	-------

Space heating requirement in kWh/m ² /year												5.22	(99)
---	--	--	--	--	--	--	--	--	--	--	--	------	------

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Cooled fraction

												0	(105)
--	--	--	--	--	--	--	--	--	--	--	--	---	-------

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
---	---	---	---	---	---	---	---	---	---	---	---	-------

Space cooling requirement in kWh/m ² /year												0	(108)
---	--	--	--	--	--	--	--	--	--	--	--	---	-------

8f. Space heating requirement

Fabric Energy Efficiency,												0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													100	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	71.54	41.52	22.19	5.41	1.06	0	0	0	0	8.21	36.4	74.9			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												349.41	(216)		
Efficiency of water heater																
	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41		(217)	
Fuel for water heating																
	56.31	49.73	52.64	45.82	44.11	39.4	38.64	40.36	41	46.13	49.56	55.64	559.34		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													261.23	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													559.34	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	107.06	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													0	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													107.06	(231)		
Electricity for lighting													124.71	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1052.33	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		43.08 (240a)
Low-rate fraction	0		43.08 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		43.08 (241a)
Low-rate fraction	0		43.08 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		43.08 (242a)

Low-rate fraction	0	43.08	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	17.65	(249)
Energy For lighting	0	20.56	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	81.29	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.31	(257)
SAP rating	95.01	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			41.43	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			78.93	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		14.85	(267)
Electricity for lighting		18	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		153.21	(272)
Dwelling CO ₂ Emission Rate		3.06	(273)
EI rating		98	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			414.59	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			851.2	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			161.95	(281)
Electricity for lighting			191.28	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			1619.02	(286)
Dwelling PE Rate			32.38	(287)

Dwelling Reference: 408
Dwelling Type: New Dwelling Design Stage
 408
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	87 (1a) x 2.6	(2a) =	226.2 (3a)
Total floor area TFA			87 (4)
Dwelling volume			226.2 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	22.69		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	10.5	918.82	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		87.75	(31)
Party Wall	0	626.4	(32)
Party floor		3480	(32a)
Party ceiling		2610	(32b)
Internal wall **		972	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		35.5	(33)
Heat capacity $C_m = \sum (A \times k)$		8607.22	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		98.93	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		4.39	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		4.39	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		39.88	(37)
Ventilation heat loss calculated monthly			
	19.23 18.99 18.75 17.56 17.32 16.13 16.13 15.89 16.61 17.32 17.8 18.27		(38)
Heat transfer coefficient, W/K			
	59.11 58.87 58.63 57.44 57.21 56.02 56.02 55.78 56.49 57.21 57.68 58.16		(39)
Heat loss parameter (HLP), W/m ² K			
	0.68 0.68 0.67 0.66 0.66 0.64 0.64 0.64 0.65 0.66 0.66 0.67		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.58	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	67.52 66.5 65.02 62.2 60.11 57.78 56.46 57.92 59.53 62.03 64.92 67.26		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	29.16 28.73 28.12 26.99 26.15 25.22 24.71 25.32 25.98 26.97 28.12 29.06		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	41.08 39.58 38.09 36.6 35.1 33.61 33.61 35.1 36.6 38.09 39.58 41.08		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		126.8	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	137.75 134.81 131.23 125.78 121.36 116.6 114.78 118.34 122.1 127.1 132.63 137.4	1519.88	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	218.17 191.97 201.69 172.19 163.37 143.38 138.81 146.53 150.57 172.47 188.95 215.13	2103.22	(45)
Distribution loss (46) = $0.15 \times (45)$			
	32.72 28.8 30.25 25.83 24.51 21.51 20.82 21.98 22.58 25.87 28.34 32.27		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel		1.61	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
245.12 216.31 228.65 198.27 190.32 169.46 165.76 173.48 176.65 199.42 215.03 242.08 2420.55		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
245.12 216.31 228.65 198.27 190.32 169.46 165.76 173.48 176.65 199.42 215.03 242.08 2420.55		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
72.54 63.83 67.06 57.25 54.32 47.67 46.15 48.72 50.06 57.35 62.83 71.53		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12 129.12		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

117.75 130.36 117.75 121.67 117.75 121.67 117.75 117.75 121.67 117.75 121.67 117.75 (67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

233.45 235.87 229.77 216.77 200.37 184.95 174.65 172.22 178.33 191.33 207.73 223.15 (68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.91 35.91 35.91 35.91 35.91 35.91 35.91 35.91 35.91 35.91 35.91 35.91 (69)

Pumps and fans gains (Table 5a)

0 0 0 0 0 0 0 0 0 0 0 0 (70)

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

-103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 -103.3 (71)

Water heating gains (Table 5)

97.5 94.98 90.14 79.52 73.01 66.21 62.04 65.49 69.53 77.08 87.26 96.14 (72)

Total internal gains

510.43 522.96 499.39 479.7 452.86 434.57 416.17 417.2 431.27 447.89 478.4 498.78 (73)

6. Solar gains

Solar gains in watts, calculated for each month

129.49 253.3 417.15 608.4 745.61 763.27 726.66 624.19 485.17 300.57 161.45 106.48 (83)

Total gains – internal and solar (watts)

639.92 776.26 916.54 1088.09 1198.47 1197.84 1142.83 1041.39 916.44 748.45 639.85 605.26 (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, $\eta_{1,m}$ (see Table 9a)

0.92 0.86 0.76 0.59 0.43 0.3 0.22 0.25 0.42 0.69 0.87 0.93 (86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.87 20.2 20.56 20.85 20.96 20.99 21 21 20.98 20.78 20.3 19.82 (87)

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

20.36 20.36 20.36 20.38 20.38 20.39 20.39 20.39 20.39 20.38 20.37 20.37 (88)

Roof Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.91 0.85 0.74 0.57 0.41 0.27 0.19 0.21 0.38 0.66 0.85 0.92 (89)

Roof Mean internal temperature in the rest of dwelling T2

19.03 19.44 19.87 20.22 20.34 20.38 20.39 20.39 20.36 20.15 19.58 18.98 (90)

Living area fraction

0.21 (91)

Mean internal temperature (for the whole dwelling)

19.2 19.6 20.01 20.35 20.47 20.51 20.52 20.52 20.49 20.28 19.73 19.15 (92)

Adjusted mean internal temperature:

19.2 19.6 20.01 20.35 20.47 20.51 20.52 20.52 20.49 20.28 19.73 19.15 (93)

8. Space heating requirement

Utilisation factor for gains,

0.89 0.83 0.73 0.57 0.41 0.27 0.19 0.22 0.39 0.66 0.84 0.9 (94)

Useful gains, mGm, W

570.82 642.82 666.59 614.93 490.65 329.39 219.03 229.1 354.73 493.5 536.14 547.46 (95)

Monthly average external temperature from Table U1

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

881 865.32 792.28 657.69 501.6 331.1 219.34 229.63 361.02 553.8 728.27 869.61 (97)

Space heating requirement for each month

230.78 149.52 93.51 30.79 8.15 0 0 0 0 44.87 138.33 239.68 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

230.78 149.52 93.51 30.79 8.15 0 0 0 0 44.87 138.33 239.68 (98c)

Space heating requirement in kWh/m²/year

10.75 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0

0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													100	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	230.78	149.52	93.51	30.79	8.15	0	0	0	0	44.87	138.33	239.68			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												340.99	(216)		
Efficiency of water heater																
	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99	340.99		(217)	
Fuel for water heating																
	71.88	63.44	67.05	58.15	55.82	49.7	48.61	50.88	51.81	58.48	63.06	70.99	709.87		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													935.63	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													709.87	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	186.28	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													0	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													186.28	(231)		
Electricity for lighting													197.45	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	2029.22	
-------------------------------------	---------	--

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		154.28 (240a)
Low-rate fraction	0		154.28 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		154.28 (241a)
Low-rate fraction	0		154.28 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		154.28 (242a)

Low-rate fraction	0	154.28	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	30.72	(249)
Energy For lighting	0	32.56	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	217.56	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.59	(257)
SAP rating	90.38	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			147.38	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			100.24	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		25.84	(267)
Electricity for lighting		28.5	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		301.96	(272)
Dwelling CO2 Emission Rate		3.47	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO2/year	
Space heating - main system 1			1481.19	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1080.51	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			281.8	(281)
Electricity for lighting			302.86	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3146.36	(286)
Dwelling PE Rate			36.17	(287)

Dwelling Reference: 409
Dwelling Type: New Dwelling Design Stage
 409
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	86 (1a) x 2.6	(2a) =	223.6 (3a)
Total floor area TFA			86 (4)
Dwelling volume			223.6 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	12.74		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	15.26	1335.32	(29a)
Roof	0	0	(30)

Total area of external elements $\sum A$, m ²		108.81	(31)
Party Wall	0	156.6	(32)
Party floor		3440	(32a)
Party ceiling		2580	(32b)
Internal wall **		1069.2	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = $\sum (A \times U)$		30.31	(33)
Heat capacity $C_m = \sum (A \times k)$		8581.12	(34)
Thermal mass parameter (TMP = $C_m \div TFA$) in kJ/m ² K		99.78	(35)
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K		5.44	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available		5.44	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$		35.75	(37)
Ventilation heat loss calculated monthly			
	19.01 18.77 18.53 17.36 17.12 15.95 15.95 15.71 16.42 17.12 17.59 18.06		(38)
Heat transfer coefficient, W/K			
	54.75 54.52 54.28 53.1 52.87 51.69 51.69 51.46 52.16 52.87 53.34 53.81		(39)
Heat loss parameter (HLP), W/m ² K			
	0.64 0.63 0.63 0.62 0.61 0.6 0.6 0.6 0.61 0.61 0.62 0.63		(40)
Number of days in month (Table 1a)			
	31 28 31 30 31 30 31 31 30 31 30 31		(41)

4. Water heating energy requirement

Assumed occupancy, N		2.57	(42)
Hot water usage in litres per day for mixer showers, $V_{d,shower}$ (from Appendix J)			
	67.26 66.25 64.77 61.96 59.88 57.56 56.24 57.7 59.3 61.79 64.67 67		(42a)
Hot water usage in litres per day for baths, $V_{d,bath}$ (from Appendix J)			
	29.05 28.62 28.01 26.89 26.05 25.12 24.62 25.22 25.88 26.87 28.01 28.95		(42b)
Hot water usage in litres per day for other uses, $V_{d,other}$ (from Appendix J)			
	40.92 39.43 37.94 36.45 34.97 33.48 33.48 34.97 36.45 37.94 39.43 40.92		(42c)
Annual average hot water usage in litres per day $V_{d,average}$ (from Appendix J)		126.32	(43)
Hot water usage in litres per day for each month $V_{d,m} = (42a) + (42b) + (42c)$			
	137.22 134.29 130.72 125.3 120.89 116.16 114.33 117.89 121.63 126.61 132.12 136.87	1514.03	(44)
Energy content of hot water used = $4.18 \times V_{d,m} \times \Delta T_m / 3600$ kWh/month (from Appendix J)			
	217.33 191.23 200.92 171.53 162.74 142.83 138.28 145.97 149.99 171.81 188.23 214.3	2095.14	(45)
Distribution loss (46) = $0.15 \times (45)$			
	32.6 28.68 30.14 25.73 24.41 21.42 20.74 21.9 22.5 25.77 28.23 32.15		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel		1.61	(47)
Water storage loss (or HIU loss)			
a) If manufacturer's declared loss factor is known (kWh/day):		0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
244.28 215.57 227.87 197.61 189.7 168.91 165.23 172.92 176.07 198.76 214.31 241.25 2412.47		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
244.28 215.57 227.87 197.61 189.7 168.91 165.23 172.92 176.07 198.76 214.31 241.25 2412.47		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
72.26 63.58 66.81 57.03 54.11 47.49 45.98 48.53 49.87 57.13 62.58 71.25		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35 128.35		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

123.81	137.08	123.81	127.94	123.81	127.94	123.81	123.81	127.94	123.81	127.94	123.81	(67)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

231.52	233.93	227.87	214.98	198.71	183.42	173.21	170.8	176.86	189.75	206.02	221.31	(68)
--------	--------	--------	--------	--------	--------	--------	-------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	(71)
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

Water heating gains (Table 5)

97.13	94.62	89.79	79.21	72.73	65.96	61.8	65.23	69.26	76.78	86.92	95.77	(72)
-------	-------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	------

Total internal gains

513.96	527.13	502.98	483.64	456.76	438.82	420.32	421.35	435.56	451.84	482.38	502.39	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

58.12	112.92	187.69	282.01	356.53	370.64	350.48	293.12	220.49	134.12	72.24	47.99	(83)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------	-------	------

Total gains – internal and solar (watts)

572.09	640.05	690.67	765.64	813.29	809.47	770.8	714.48	656.06	585.96	554.63	550.39	(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, $\alpha_{1,m}$ (see Table 9a)

0.93	0.9	0.85	0.72	0.57	0.4	0.29	0.33	0.53	0.77	0.9	0.94	(86)
------	-----	------	------	------	-----	------	------	------	------	-----	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.9	20.13	20.41	20.74	20.92	20.98	21	20.99	20.96	20.72	20.29	19.88	(87)
------	-------	-------	-------	-------	-------	----	-------	-------	-------	-------	-------	------

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

20.4	20.4	20.4	20.41	20.42	20.43	20.43	20.43	20.42	20.42	20.41	20.41	(88)
------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\alpha_{2,m}$ (see Table 9a)

0.93	0.89	0.83	0.7	0.54	0.37	0.26	0.29	0.49	0.75	0.88	0.93	(89)
------	------	------	-----	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

19.09	19.38	19.73	20.14	20.34	20.42	20.43	20.43	20.38	20.12	19.59	19.07	(90)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.19	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.25	19.52	19.86	20.25	20.45	20.53	20.54	20.54	20.5	20.23	19.73	19.23	(92)
-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	------

Adjusted mean internal temperature:

19.25	19.52	19.86	20.25	20.45	20.53	20.54	20.54	20.5	20.23	19.73	19.23	(93)
-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.91 0.87 0.82 0.69 0.54 0.37 0.26 0.3 0.49 0.74 0.87 0.92 (94)

Useful gains, mGm, W

520.64 559.14 563.65 532.08 440.41 302.7 202.88 211.87 322.63 433.98 481.7 505.28 (95)

Monthly average external temperature from Table U1

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

818.57 797.23 725.32 602.96 462.52 306.37 203.54 212.93 333.62 509.33 673.54 808.69 (97)

Space heating requirement for each month

221.66 160 120.28 51.03 16.45 0 0 0 0 56.06 138.12 225.74 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

221.66 160 120.28 51.03 16.45 0 0 0 0 56.06 138.12 225.74 (98c)

Space heating requirement in kWh/m²/year

11.5 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0	0	(201)
Fraction of space heat from main system(s),		1	(202)
Fraction of main heating from main system 2,		0	(203)
Fraction of total space heat from main system 1,		1	(204)
Fraction of total space heat from main system 2,		0	(205)
Efficiency of main space heating system 1 (in %),		100	(206)
Efficiency of main space heating system 2 (in %),		0	(207)
Efficiency of secondary/supplementary heating system, %,		0	(208)
Cooling System Seasonal Energy Efficiency Ratio,	0	0	(209)
Space heating requirement (calculated above),			
0 0 0 0 0 0 0 0 0 0 0 0 0			(210)
Space heating fuel (main heating system 1), kWh/month	0	0	
221.66 160 120.28 51.03 16.45 0 0 0 0 56.06 138.12 225.74			(211)
Space heating fuel (main heating system 2), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(213)
Space heating fuel (secondary), kWh/month	0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0			(215)
Output from water heater),	0	341.14	(216)
Efficiency of water heater			
341.14 341.14 341.14 341.14 341.14 341.14 341.14 341.14 341.14 341.14 341.14 341.14			(217)
Fuel for water heating			
71.61 63.19 66.8 57.93 55.61 49.51 48.43 50.69 51.61 58.26 62.82 70.72		707.18	(219)
Space Cooling			
0 0 0 0 0 0 0 0 0 0 0 0 0			(221)
Annual totals			
Space heating fuel used, main system 1		989.34	(211)
Space heating fuel used, main system 2		0	(213)
Space heating fuel used, secondary		0	(215)
Water heating fuel used		707.18	(219)
Electricity for instantaneous electric shower(s)		0	(64a)
Space cooling fuel used		0	(221)
Electricity for pumps, fans and electric keep-hot			
Mechanical vent fans - balanced, extract or positive input from outside	0	0	187.54 (230a)
warm air heating system fans		0	(230b)
Heating circulation pump or water pump within warm air heating unit		0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)		0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)		0	(230e)
Maintaining electric keep-hot facility for gas combi boiler		0	(230f)
Pump for solar water heating		0	(230g)
Pump for storage WWHRs		0	(230h)
Total electricity for the above		187.54	(231)
Electricity for lighting		207.62	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 0 (233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 0 (234a)

Electricity generated by hydro-electric generators

0 0 0 0 0 0 0 0 0 0 0 0 0 (235a)

Electricity used or net electricity generated by micro-CHP

0 0 0 0 0 0 0 0 0 0 0 0 0 (235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 0 (233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 0 (234b)

Electricity generated by hydro-electric generators

0 0 0 0 0 0 0 0 0 0 0 0 0 (235b)

Electricity used or net electricity generated by micro-CHP

0 0 0 0 0 0 0 0 0 0 0 0 0 (235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved 0 (236a)

energy used 0 (237a)

Total delivered energy for all uses 2091.69

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		163.14 (240a)
Low-rate fraction	0		163.14 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		163.14 (241a)
Low-rate fraction	0		163.14 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		163.14 (242a)

Low-rate fraction	0	163.14	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	30.93	(249)
Energy For lighting	0	34.24	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	228.31	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.63	(257)
SAP rating	89.83	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			154.88	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			99.85	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		26.01	(267)
Electricity for lighting		29.97	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		310.71	(272)
Dwelling CO ₂ Emission Rate		3.61	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1562.71	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1076.42	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			283.72	(281)
Electricity for lighting			318.45	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3241.3	(286)
Dwelling PE Rate			37.69	(287)

Dwelling Reference: 410
Dwelling Type: New Dwelling Design Stage
 410
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	50 (1a) x 2.6	(2a) =	130 (3a)
Total floor area TFA			50 (4)
Dwelling volume			130 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			2	(19)
Shelter factor			0.85	(20)

Infiltration rate incorporating shelter factor													0.13	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	1.67	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)
Effective air change rate from PCDB:														
	0.26	0.25	0.25	0.24	0.23	0.22	0.22	0.21	0.22	0.23	0.24	0.24		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.31		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	10.25	896.56	(29a)
Roof	0	0	(30)

Total area of external elements ΣA , m ²												78.84	(31)												
Party Wall												0	(32)												
Party floor												2000	(32a)												
Party ceiling												1500	(32b)												
Internal wall **												729	(33c)												
Internal floor												0	(32d)												
Internal ceiling floor												0	(32e)												
Fabric heat loss, W/K = $\Sigma (A \times U)$												26.86	(33)												
Heat capacity Cm = $\Sigma(A \times k)$												5125.56	(34)												
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K												102.51	(35)												
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K												3.94	(36)												
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available												3.94	(36a)												
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$												30.8	(37)												
Ventilation heat loss calculated monthly																									
												11.05	10.91	10.78	10.09	9.96	9.27	9.27	9.14	9.55	9.96	10.23	10.5	(38)	
Heat transfer coefficient, W/K																									(39)
												41.85	41.71	41.58	40.89	40.76	40.07	40.07	39.94	40.35	40.76	41.03	41.3	(39)	
Heat loss parameter (HLP), W/m ² K																									(40)
												0.84	0.83	0.83	0.82	0.82	0.8	0.8	0.8	0.81	0.82	0.82	0.83	(40)	
Number of days in month (Table 1a)																									(41)
												31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirement

Assumed occupancy, N													1.69	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	52.56	51.77	50.62	48.41	46.79	44.98	43.95	45.09	46.34	48.29	50.54	52.36	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	22.72	22.39	21.91	21.04	20.38	19.65	19.26	19.73	20.24	21.02	21.92	22.65	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	31.94	30.78	29.62	28.45	27.29	26.13	26.13	27.29	28.45	29.62	30.78	31.94	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													98.7	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	107.22	104.93	102.14	97.9	94.46	90.76	89.34	92.11	95.04	98.93	103.23	106.94	1183	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	169.81	149.42	156.99	134.03	127.16	111.6	108.04	114.05	117.19	134.24	147.07	167.44	1637.06	(45)
Distribution loss (46) = 0.15 x (45)														
	25.47	22.41	23.55	20.1	19.07	16.74	16.21	17.11	17.58	20.14	22.06	25.12	(46)	
Storage volume (litres) including any solar or WWHRs storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
196.76 173.76 183.94 160.11 154.11 137.68 135 141.01 143.28 161.19 173.15 194.4 1954.39		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
56.46 49.68 52.2 44.56 42.28 37.11 35.92 37.92 38.97 44.64 48.9 55.68		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51 84.51		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

74.26	82.22	74.26	76.74	74.26	76.74	74.26	74.26	76.74	74.26	76.74	74.26	(67)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

147.23	148.76	144.91	136.72	126.37	116.64	110.15	108.62	112.47	120.67	131.01	140.74	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	31.45	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	-67.6	(71)
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Water heating gains (Table 5)

75.89	73.93	70.16	61.89	56.83	51.54	48.29	50.97	54.12	59.99	67.92	74.83	(72)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Total internal gains

345.74	353.26	337.69	323.7	305.81	293.27	281.05	282.21	291.68	303.27	324.02	338.18	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

119.3	201.43	274.56	344.49	394.15	396.12	379.81	341.25	298.13	221.99	142.48	102.42	(83)
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Total gains – internal and solar (watts)

465.04	554.7	612.25	668.19	699.96	689.39	660.86	623.46	589.81	525.26	466.5	440.6	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.89	0.83	0.76	0.64	0.51	0.36	0.26	0.29	0.45	0.68	0.84	0.9	(86)
------	------	------	------	------	------	------	------	------	------	------	-----	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.72	20.06	20.38	20.7	20.89	20.97	20.99	20.99	20.94	20.7	20.19	19.67	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.22	20.22	20.23	20.24	20.24	20.25	20.25	20.25	20.25	20.24	20.24	20.23	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.88	0.82	0.74	0.61	0.47	0.32	0.22	0.25	0.41	0.65	0.82	0.89	(89)
------	------	------	------	------	------	------	------	------	------	------	------	------

Roof

Mean internal temperature in the rest of dwelling T2

18.74	19.15	19.54	19.93	20.14	20.23	20.25	20.25	20.2	19.93	19.33	18.68	(90)
-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	-------	------

Living area fraction

												0.36	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

19.1	19.48	19.85	20.21	20.41	20.5	20.52	20.52	20.47	20.21	19.64	19.04	(92)
------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

19.1	19.48	19.85	20.21	20.41	20.5	20.52	20.52	20.47	20.21	19.64	19.04	(93)
------	-------	-------	-------	-------	------	-------	-------	-------	-------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.86	0.8	0.73	0.61	0.48	0.34	0.24	0.26	0.42	0.65	0.8	0.88	(94)
------	-----	------	------	------	------	------	------	------	------	-----	------	------

Useful gains, mGm , W

400.67	443.79	445.44	409.84	335.72	232.21	156.1	163.13	247.84	339.6	375.21	385.56	(95)
--------	--------	--------	--------	--------	--------	-------	--------	--------	-------	--------	--------	------

Monthly average external temperature from Table U1

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

619.32	608.19	554.95	462.56	355	236.48	157.05	164.48	257.05	391.78	514.57	612.83	(97)
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Space heating requirement for each month

162.68	110.48	81.47	37.96	14.34	0	0	0	0	38.82	100.34	169.08	(98a)
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Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)
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Space heating requirement for each month after solar contribution

162.68	110.48	81.47	37.96	14.34	0	0	0	0	38.82	100.34	169.08	(98c)
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Space heating requirement in kWh/m²/year

14.3	(99)
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8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)
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Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)
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Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)
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Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)
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Space cooling requirement for month, whole dwelling, continuous (kWh)

0	0	0	0	0	0	0	0	0	0	0	0	(104)
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Cooled fraction

												0	(105)
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Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)
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Space cooling requirement for month

0	0	0	0	0	0	0	0	0	0	0	0	(107)
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Space cooling requirement in kWh/m²/year

												0	(108)
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8f. Space heating requirement

Fabric Energy Efficiency,

0	0	(109)
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9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													100	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)		
Space heating fuel (main heating system 1), kWh/month	0												0			
	162.68	110.48	81.47	37.96	14.34	0	0	0	0	38.82	100.34	169.08		(211)		
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(213)		
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0		(215)		
Output from water heater),	0												349.41	(216)		
Efficiency of water heater																
	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41	349.41		(217)		
Fuel for water heating																
	56.31	49.73	52.64	45.82	44.11	39.4	38.64	40.36	41	46.13	49.56	55.64	559.34	(219)		
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0		(221)		
Annual totals													kWh/year	kWh/year		
Space heating fuel used, main system 1													715.18	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													559.34	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	107.06	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													0	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													107.06	(231)		
Electricity for lighting													124.53	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
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Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
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Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
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Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1506.1	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		117.93 (240a)
Low-rate fraction	0		117.93 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		117.93 (241a)
Low-rate fraction	0		117.93 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		117.93 (242a)

Low-rate fraction	0	117.93	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	17.65	(249)
Energy For lighting	0	20.54	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	156.12	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.59	(257)
SAP rating	90.41	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			111.97	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			78.93	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		14.85	(267)
Electricity for lighting		17.97	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		223.72	(272)
Dwelling CO ₂ Emission Rate		4.47	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			1129.68	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			851.2	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			161.95	(281)
Electricity for lighting			191.01	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			2333.85	(286)
Dwelling PE Rate			46.68	(287)

Dwelling Reference: 605
Dwelling Type: New Dwelling Design Stage
 605
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	60 (1a) x 2.6	(2a) =	156 (3a)
Total floor area TFA			60 (4)
Dwelling volume			156 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)		0	0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc		0	0	(9)
Additional infiltration		0	0	(10)
Structural infiltration		0	0	(11)
Suspended wooden ground floor		0	0	(12)
No draught lobby		0	0	(13)
Percentage of windows and doors draught proofed		0	0	(14)
Window infiltration		0	0	(15)
Infiltration rate		0	0	(16)
Air permeability value, AP50, (m ³ /h/m ²)		3	3	(17)
Air permeability value, AP4, (m ³ /h/m ²)		0	0	(17a)
Air permeability value)		0.15	0.15	(18)
Number of sides on which dwelling is sheltered		3	3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	14.31		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	4.98	435.4	(29a)
Roof	6	450	(30)

Total area of external elements $\sum A$, m ²													95.9	(31)											
Party Wall													0	783	(32)										
Party floor													2400	(32a)											
Party ceiling													0	(32b)											
Internal wall **													1069.2	(33c)											
Internal floor													0	(32d)											
Internal ceiling floor													0	(32e)											
Fabric heat loss, W/K = $\sum (A \times U)$													27.59	(33)											
Heat capacity Cm = $\sum(A \times k)$													5137.6	(34)											
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													85.63	(35)											
Linear Thermal bridges: $\sum (L \times \Psi)$ calculated using Appendix K													4.8	(36)											
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available													4.8	(36a)											
Total fabric heat loss H = $\sum(A \times U) + \sum(L \times \Psi) + \sum \chi$													32.38	(37)											
Ventilation heat loss calculated monthly																									
													12.52	12.37	12.22	11.47	11.32	10.58	10.58	10.43	10.88	11.32	11.62	11.92	(38)
Heat transfer coefficient, W/K																									
													44.9	44.76	44.61	43.86	43.71	42.96	42.96	42.81	43.26	43.71	44.01	44.31	(39)
Heat loss parameter (HLP), W/m ² K																									
													0.75	0.75	0.74	0.73	0.73	0.72	0.72	0.71	0.72	0.73	0.73	0.74	(40)
Number of days in month (Table 1a)																									
													31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N													1.98	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	57.45	56.58	55.32	52.92	51.14	49.16	48.03	49.28	50.65	52.78	55.24	57.22		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	24.83	24.46	23.94	22.98	22.26	21.47	21.04	21.56	22.12	22.97	23.94	24.74		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	34.92	33.65	32.38	31.11	29.84	28.57	28.57	29.84	31.11	32.38	33.65	34.92		(42c)
Annual average hot water usage in litres per day Vd,average (from Appendix J)													107.88	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	117.2	114.69	111.65	107.01	103.25	99.2	97.65	100.68	103.88	108.13	112.83	116.89	1293.07	(44)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	185.61	163.32	171.6	146.49	138.99	121.98	118.1	124.67	128.1	146.73	160.75	183.02	1789.36	(45)
Distribution loss (46) = 0.15 x (45)														
	27.84	24.5	25.74	21.97	20.85	18.3	17.71	18.7	19.21	22.01	24.11	27.45		(46)
Storage volume (litres) including any solar or WWHRs storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer's declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
212.56 187.67 198.55 172.58 165.94 148.06 145.05 151.62 154.18 173.68 186.84 209.98 2106.7		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
212.56 187.67 198.55 172.58 165.94 148.06 145.05 151.62 154.18 173.68 186.84 209.98 2106.7		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
61.71 54.3 57.06 48.71 46.22 40.56 39.27 41.45 42.59 48.79 53.45 60.86		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts		
99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08 99.08		(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

87.23	96.58	87.23	90.14	87.23	90.14	87.23	87.23	90.14	87.23	90.14	87.23	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

172.95	174.74	170.22	160.59	148.44	137.02	129.38	127.59	132.11	141.74	153.89	165.32	(68)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	32.91	(69)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
---	---	---	---	---	---	---	---	---	---	---	---	------

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

-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	-79.27	(71)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

Water heating gains (Table 5)

82.95	80.81	76.69	67.65	62.12	56.33	52.78	55.71	59.16	65.58	74.24	81.79	(72)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Total internal gains

395.85	404.85	386.86	371.11	350.51	336.21	322.12	323.26	334.13	347.27	370.99	387.07	(73)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

6. Solar gains

Solar gains in watts, calculated for each month

81.66	159.75	263.09	383.7	470.24	481.37	458.29	393.66	305.98	189.56	101.83	67.16	(83)
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Total gains – internal and solar (watts)

477.52	564.61	649.95	754.81	820.75	817.59	780.41	716.92	640.12	536.83	472.82	454.22	(84)
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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, $\eta_{1,m}$ (see Table 9a)

0.89	0.84	0.76	0.61	0.47	0.33	0.24	0.27	0.44	0.69	0.85	0.91	(86)
------	------	------	------	------	------	------	------	------	------	------	------	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.58	19.92	20.32	20.7	20.9	20.98	20.99	20.99	20.94	20.64	20.07	19.53	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.3	20.3	20.3	20.31	20.32	20.33	20.33	20.33	20.32	20.32	20.31	20.31	(88)
------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.88	0.83	0.74	0.59	0.44	0.3	0.2	0.23	0.4	0.67	0.83	0.9	(89)
------	------	------	------	------	-----	-----	------	-----	------	------	-----	------

Roof

Mean internal temperature in the rest of dwelling T2

18.63	19.05	19.53	20	20.21	20.31	20.32	20.32	20.27	19.93	19.24	18.57	(90)
-------	-------	-------	----	-------	-------	-------	-------	-------	-------	-------	-------	------

Living area fraction

												0.24	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

18.86	19.26	19.72	20.17	20.38	20.47	20.49	20.48	20.43	20.1	19.44	18.81	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

Adjusted mean internal temperature:

18.86	19.26	19.72	20.17	20.38	20.47	20.49	20.48	20.43	20.1	19.44	18.81	(93)
-------	-------	-------	-------	-------	-------	-------	-------	-------	------	-------	-------	------

8. Space heating requirement

Utilisation factor for gains,

0.86 0.8 0.72 0.58 0.44 0.3 0.21 0.24 0.41 0.66 0.81 0.87 (94)

Useful gains, mGm , W

410.97 454.08 468.01 440.42 361.09 248.12 166 173.46 263.11 352.1 382.79 396.48 (95)

Monthly average external temperature from Table U1

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

653.97 642.68 589.81 494.19 379.41 252.12 166.92 174.86 273.76 415.39 543.25 647.16 (97)

Space heating requirement for each month

180.79 126.74 90.62 38.72 13.63 0 0 0 0 47.09 115.53 186.51 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

180.79 126.74 90.62 38.72 13.63 0 0 0 0 47.09 115.53 186.51 (98c)

Space heating requirement in kWh/m²/year

13.33 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)		
Fraction of space heat from main system(s),													1	(202)		
Fraction of main heating from main system 2,													0	(203)		
Fraction of total space heat from main system 1,													1	(204)		
Fraction of total space heat from main system 2,													0	(205)		
Efficiency of main space heating system 1 (in %),													100	(206)		
Efficiency of main space heating system 2 (in %),													0	(207)		
Efficiency of secondary/supplementary heating system, %,													0	(208)		
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)		
Space heating requirement (calculated above),																
	0	0	0	0	0	0	0	0	0	0	0	0	0		(210)	
Space heating fuel (main heating system 1), kWh/month	0												0			
	180.79	126.74	90.62	38.72	13.63	0	0	0	0	47.09	115.53	186.51			(211)	
Space heating fuel (main heating system 2), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(213)	
Space heating fuel (secondary), kWh/month	0												0			
	0	0	0	0	0	0	0	0	0	0	0	0			(215)	
Output from water heater),	0												346.98	(216)		
Efficiency of water heater																
	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98	346.98		(217)	
Fuel for water heating																
	61.26	54.09	57.22	49.74	47.83	42.67	41.8	43.7	44.43	50.06	53.85	60.52	607.16		(219)	
Space Cooling																
	0	0	0	0	0	0	0	0	0	0	0	0			(221)	
Annual totals																
													kWh/year	kWh/year		
Space heating fuel used, main system 1													799.61	(211)		
Space heating fuel used, main system 2													0	(213)		
Space heating fuel used, secondary													0	(215)		
Water heating fuel used													607.16	(219)		
Electricity for instantaneous electric shower(s)													0	(64a)		
Space cooling fuel used													0	(221)		
Electricity for pumps, fans and electric keep-hot																
Mechanical vent fans - balanced, extract or positive input from outside	0												0	130.85	(230a)	
warm air heating system fans													0	(230b)		
Heating circulation pump or water pump within warm air heating unit													0	(230c)		
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)		
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)		
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)		
Pump for solar water heating													0	(230g)		
Pump for storage WWHRS													0	(230h)		
Total electricity for the above													130.85	(231)		
Electricity for lighting													146.28	(232)		

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
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Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
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energy used	0	(237a)
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Total delivered energy for all uses	1683.89	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		131.86 (240a)
Low-rate fraction	0		131.86 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		131.86 (241a)
Low-rate fraction	0		131.86 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		131.86 (242a)

Low-rate fraction	0	131.86	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	21.58	(249)
Energy For lighting	0	24.12	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	177.55	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.61	(257)
SAP rating	90.13	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			125.2	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			85.7	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		18.15	(267)
Electricity for lighting		21.11	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		250.16	(272)
Dwelling CO2 Emission Rate		4.17	(273)
EI rating		97	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO2/year	
Space heating - main system 1			1263.08	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			924.04	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			197.94	(281)
Electricity for lighting			224.37	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			2609.43	(286)
Dwelling PE Rate			43.49	(287)

Dwelling Reference: 606
Dwelling Type: New Dwelling Design Stage
 606
 30-48 Lawrence Road
 London
 N15 4EG

1. Overall dwelling dimensions

	Area(m ²)	Av. Height(m)	Volume(m ³)
Ground Floor	54 (1a) x 2.6	(2a) =	140.4 (3a)
Total floor area TFA			54 (4)
Dwelling volume			140.4 (5)

2. Ventilation Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract 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				
Number of storeys in the dwelling (ns)			0	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc			0	(9)
Additional infiltration			0	(10)
Structural infiltration			0	(11)
Suspended wooden ground floor			0	(12)
No draught lobby			0	(13)
Percentage of windows and doors draught proofed			0	(14)
Window infiltration			0	(15)
Infiltration rate			0	(16)
Air permeability value, AP50, (m ³ /h/m ²)			3	(17)
Air permeability value, AP4, (m ³ /h/m ²)			0	(17a)
Air permeability value)			0.15	(18)
Number of sides on which dwelling is sheltered			3	(19)
Shelter factor			0.78	(20)

Infiltration rate incorporating shelter factor													0.12	(21)
Infiltration rate modified for monthly wind speed														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor														
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14	1.53	(22b)
Calculate effective air change rate for the applicable case:														
													0.5	(23a)
													0.5	(23b)
													81	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	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														
	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														
	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air change rate														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)
Effective air change rate from PCDB:														
	0.24	0.24	0.24	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.23	0.23		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	2.3		(26)
Windows	37.21		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	0	0	(28a)
Exposed floor	0	0	(28b)
Basement wall	0	0	(29)
External wall	6.74	590.1	(29a)
Roof	6.48	486	(30)

Total area of external elements ΣA , m ²													130.95	(31)											
Party Wall													0	210.6	(32)										
Party floor													2160	(32a)											
Party ceiling													0	(32b)											
Internal wall **													972	(33c)											
Internal floor													0	(32d)											
Internal ceiling floor													0	(32e)											
Fabric heat loss, W/K = $\Sigma (A \times U)$													52.74	(33)											
Heat capacity Cm = $\Sigma(A \times k)$													4418.7	(34)											
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m ² K													81.83	(35)											
Linear Thermal bridges: $\Sigma (L \times \Psi)$ calculated using Appendix K													6.55	(36)											
Point Thermal bridges: $\Sigma \chi$ (W/K) if significant point thermal bridge present and values available													6.55	(36a)											
Total fabric heat loss H = $\Sigma(A \times U) + \Sigma(L \times \Psi) + \Sigma \chi$													59.29	(37)											
Ventilation heat loss calculated monthly																									
													11.27	11.13	11	10.33	10.19	9.52	9.52	9.38	9.79	10.19	10.46	10.73	(38)
Heat transfer coefficient, W/K																									
													70.55	70.42	70.28	69.61	69.48	68.8	68.8	68.67	69.07	69.48	69.75	70.02	(39)
Heat loss parameter (HLP), W/m ² K																									
													1.31	1.3	1.3	1.29	1.29	1.27	1.27	1.27	1.28	1.29	1.29	1.3	(40)
Number of days in month (Table 1a)																									
													31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N													1.81	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)														
	54.53	53.71	52.52	50.24	48.55	46.67	45.6	46.78	48.08	50.1	52.44	54.32	(42a)	
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)														
	23.57	23.22	22.73	21.82	21.14	20.39	19.98	20.47	21	21.81	22.74	23.49	(42b)	
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)														
	33.15	31.94	30.74	29.53	28.32	27.12	27.12	28.32	29.53	30.74	31.94	33.15	(42c)	
Annual average hot water usage in litres per day Vd,average (from Appendix J)													102.41	(43)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)														
	111.25	108.88	105.99	101.59	98.02	94.17	92.7	95.58	98.62	102.65	107.11	110.97	1227.52 (44)	
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)														
	176.2	155.04	162.9	139.07	131.95	115.8	112.11	118.35	121.6	139.29	152.6	173.75	1698.65 (45)	
Distribution loss (46) = 0.15 x (45)														
	26.43	23.26	24.43	20.86	19.79	17.37	16.82	17.75	18.24	20.89	22.89	26.06	(46)	
Storage volume (litres) including any solar or WWHRS storage within same vessel													1.61	(47)
Water storage loss (or HIU loss)														
a) If manufacturer’s declared loss factor is known (kWh/day):													0.54	(48)

Temperature factor from Table 2b	0.87	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.87	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) x (41)		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m $\square$ [(47) - Vs] $\div$ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.95 24.34 26.95 26.08 26.95 26.08 26.95 26.95 26.08 26.95 26.08 26.95		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)		
0 0 0 0 0 0 0 0 0 0 0 0		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = 0.85 x (45) + (46) + (57) + (59) + (61)		
203.15 179.39 189.85 165.15 158.9 141.88 139.06 145.3 147.68 166.24 178.69 200.7 2015.98		(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
203.15 179.39 189.85 165.15 158.9 141.88 139.06 145.3 147.68 166.24 178.69 200.7 2015.98		(64)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month 0.25 x [0.85 x (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]		
58.59 51.55 54.16 46.24 43.87 38.5 37.28 39.35 40.43 46.31 50.74 57.77		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts													
90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4 90.4													(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

79.49	88.01	79.49	82.14	79.49	82.14	79.49	79.49	82.14	79.49	82.14	79.49	(67)
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Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

157.6	159.24	155.12	146.35	135.27	124.86	117.91	116.27	120.39	129.17	140.24	150.65	(68)
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Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	(69)
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Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)
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Losses e.g. evaporation (negative values) (Table 5)

-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	-72.32	(71)
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Water heating gains (Table 5)

78.74	76.71	72.8	64.22	58.97	53.48	50.1	52.89	56.16	62.25	70.47	77.65	(72)
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Total internal gains

365.96	374.08	357.53	342.83	323.85	310.6	297.62	298.77	308.81	321.03	342.98	357.91	(73)
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6. Solar gains

Solar gains in watts, calculated for each month

193.6	377.73	624.28	921.08	1142.84	1177.17	1117.66	949.86	728.88	448.37	241.11	159.46	(83)
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Total gains – internal and solar (watts)

559.57	751.81	981.81	1263.91	1466.69	1487.78	1415.28	1248.64	1037.69	769.4	584.08	517.37	(84)
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7. Mean internal temperature (heating season)

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

												21	(85)
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Utilisation factor for gains for living area, $\eta_{1,m}$ (see Table 9a)

0.88	0.81	0.7	0.54	0.4	0.28	0.21	0.24	0.41	0.66	0.83	0.9	(86)
------	------	-----	------	-----	------	------	------	------	------	------	-----	------

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.27	18.9	19.66	20.35	20.74	20.91	20.97	20.95	20.79	20.15	19.06	18.15	(87)
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Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

19.84	19.84	19.84	19.85	19.85	19.86	19.86	19.86	19.86	19.85	19.85	19.84	(88)
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Roof

Utilisation factor for gains for rest of dwelling, $\eta_{2,m}$ (see Table 9a)

0.87	0.79	0.67	0.5	0.35	0.23	0.16	0.19	0.35	0.62	0.81	0.89	(89)
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Roof

Mean internal temperature in the rest of dwelling T2

16.72	17.49	18.4	19.2	19.61	19.8	19.84	19.84	19.69	19	17.72	16.57	(90)
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Living area fraction

												0.25	(91)
--	--	--	--	--	--	--	--	--	--	--	--	------	------

Mean internal temperature (for the whole dwelling)

17.11	17.84	18.71	19.49	19.89	20.07	20.12	20.12	19.97	19.29	18.05	16.97	(92)
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------

Adjusted mean internal temperature:

17.11	17.84	18.71	19.49	19.89	20.07	20.12	20.12	19.97	19.29	18.05	16.97	(93)
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8. Space heating requirement

Utilisation factor for gains,

0.83 0.75 0.64 0.49 0.36 0.24 0.17 0.2 0.36 0.6 0.77 0.84 (94)

Useful gains, mGm, W

462.54 561.37 625.37 621.14 522.68 362.61 238.26 248.85 371.98 461.04 450.26 436.5 (95)

Monthly average external temperature from Table U1

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

903.58 911.39 858.31 737.14 569.35 376.69 242.5 255.14 405.34 603.76 763.97 893.83 (97)

Space heating requirement for each month

328.13 235.21 173.31 83.52 34.72 0 0 0 0 106.18 225.87 340.26 (98a)

Solar space heating calculated using Appendix H (negative quantity)

0 0 0 0 0 0 0 0 0 0 0 0 (98b)

Space heating requirement for each month after solar contribution

328.13 235.21 173.31 83.52 34.72 0 0 0 0 106.18 225.87 340.26 (98c)

Space heating requirement in kWh/m²/year

28.28 (99)

8c. Space Cooling requirement

Heat loss rate,

0 0 0 0 0 0 0 0 0 0 0 0 (100)

Utilisation factor for loss

0 0 0 0 0 0 0 0 0 0 0 0 (101)

Useful loss, mLm (watts)

0 0 0 0 0 0 0 0 0 0 0 0 (102)

Gains

0 0 0 0 0 0 0 0 0 0 0 0 (103)

Space cooling requirement for month, whole dwelling, continuous (kWh)

0 0 0 0 0 0 0 0 0 0 0 0 (104)

Cooled fraction

0 0 0 0 0 0 0 0 0 0 0 0 (105)

Intermittency factor

0 0 0 0 0 0 0 0 0 0 0 0 (106)

Space cooling requirement for month

0 0 0 0 0 0 0 0 0 0 0 0 (107)

Space cooling requirement in kWh/m²/year

0 0 0 0 0 0 0 0 0 0 0 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency,

0 0 (109)

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

Fraction of space heat from secondary/supplementary system,	0												0	(201)	
Fraction of space heat from main system(s),													1	(202)	
Fraction of main heating from main system 2,													0	(203)	
Fraction of total space heat from main system 1,													1	(204)	
Fraction of total space heat from main system 2,													0	(205)	
Efficiency of main space heating system 1 (in %),													100	(206)	
Efficiency of main space heating system 2 (in %),													0	(207)	
Efficiency of secondary/supplementary heating system, %,													0	(208)	
Cooling System Seasonal Energy Efficiency Ratio,	0												0	(209)	
Space heating requirement (calculated above),															
	0	0	0	0	0	0	0	0	0	0	0	0	0	(210)	
Space heating fuel (main heating system 1), kWh/month	0												0		
	328.13	235.21	173.31	83.52	34.72	0	0	0	0	106.18	225.87	340.26		(211)	
Space heating fuel (main heating system 2), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(213)	
Space heating fuel (secondary), kWh/month	0												0		
	0	0	0	0	0	0	0	0	0	0	0	0		(215)	
Output from water heater),	0												348.71	(216)	
Efficiency of water heater															
	348.71	348.71	348.71	348.71	348.71	348.71	348.71	348.71	348.71	348.71	348.71	348.71		(217)	
Fuel for water heating															
	58.26	51.44	54.44	47.36	45.57	40.69	39.88	41.67	42.35	47.67	51.24	57.55	578.13	(219)	
Space Cooling															
	0	0	0	0	0	0	0	0	0	0	0	0		(221)	
Annual totals															
													kWh/year	kWh/year	
Space heating fuel used, main system 1													1527.21	(211)	
Space heating fuel used, main system 2													0	(213)	
Space heating fuel used, secondary													0	(215)	
Water heating fuel used													578.13	(219)	
Electricity for instantaneous electric shower(s)													0	(64a)	
Space cooling fuel used													0	(221)	
Electricity for pumps, fans and electric keep-hot															
Mechanical vent fans - balanced, extract or positive input from outside	0												0	115.62	(230a)
warm air heating system fans													0	(230b)	
Heating circulation pump or water pump within warm air heating unit													0	(230c)	
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)	
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													0	(230e)	
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)	
Pump for solar water heating													0	(230g)	
Pump for storage WWHRS													0	(230h)	
Total electricity for the above													115.62	(231)	
Electricity for lighting													133.3	(232)	

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--------

Appendix Q items: annual energy

Appendix Q, <item 1 description>

Fuel kWh/year

energy saved	0	(236a)
--------------	---	--------

energy used	0	(237a)
-------------	---	--------

Total delivered energy for all uses	2354.26	
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10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year
Space heating - main system 1 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		251.84 (240a)
Low-rate fraction	0		251.84 (240b)
High-rate cost	0		0 (240c)
Low-rate cost	0		0 (240d)
Space heating - main system 1 cost (other fuel)	0		0 (240e)
Space heating - main system 2 (electric off-peak tariff			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		251.84 (241a)
Low-rate fraction	0		251.84 (241b)
High-rate cost	0		0 (241c)
Low-rate cost	0		0 (241d)
Space heating - main system 2 cost (other fuel)	0		0 (241e)
Space heating - secondary (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		251.84 (242a)

Low-rate fraction	0	251.84	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Space heating - secondary cost (other fuel)	0	0	(242e)
Water heating (electric off-peak tariff)			
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0	0	(243)
Low-rate fraction	0	0	(242b)
High-rate cost	0	0	(242c)
Low-rate cost	0	0	(242d)
Water heating cost (other fuel)	0	0	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247))			
Energy For instantaneous electric shower(s)	0	0	(247a)
Space cooling	0	0	(248)
Pumps, fans And electric keep-hot	0	19.07	(249)
Energy For lighting	0	21.98	(250)
Additional standing charges	0	0	(251)
Energy saving/generation technologies	0	0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved Or generated	0	0	(253)
energy used	0	0	(254)
Total energy cost	0	292.88	(255)
11a. SAP rating – Individual heating systems including micro-CHP			
Energy cost deflator	0	0	(256)
Energy cost factor (ECF)	0	0	(257)
SAP rating	0	0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	1.07	(257)
SAP rating	82.74	(258)

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

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			238.17	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			81.59	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		16.04	(267)
Electricity for lighting		19.24	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO ₂ , kg/year		355.04	(272)
Dwelling CO ₂ Emission Rate		6.57	(273)
EI rating		95	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO ₂ /year	
Space heating - main system 1			2408.91	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			879.82	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			174.91	(281)
Electricity for lighting			204.46	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			3668.11	(286)
Dwelling PE Rate			67.93	(287)

Project name

Notional Baseline

As designed

Date: Tue Apr 09 18:19:51 2024

Administrative information

Building Details

Address: Commercial Building, 30 - 48 Lawrence Road,
London, N15 4EG

Certifier details

Name: Ondrej Gajdos

Telephone number: 02080995978

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 768.58

The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m²annum	2.25
Building CO ₂ emission rate (BER), kgCO ₂ /m²annum	4.73
Target primary energy rate (TPER), kWh _{PE} /m²annum	23.66
Building primary energy rate (BPER), kWh _{PE} /m²annum	49.62
Do the building's emission and primary energy rates exceed the targets?	BER > TER BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.48	0.55	0GF - workshop_W_8
Floors	0.18	0.19	0.21	0GF - workshop_S_2
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.16	0.16	0GF - ofc1_R_3
Windows** and roof windows	1.6	1.6	1.6	0GF - ofc1_G_6
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]

U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	25

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Split

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	3	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Project DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard	
0GF - ofc1	-	-	-	-	0.8	-	-	-	-	0.85	N/A	
0GF - workshop	-	-	-	-	0.8	-	-	-	-	0.85	N/A	
0GF - services	-	-	-	-	0.8	-	-	-	-	0.85	N/A	
0GF - ofc2	-	-	-	-	0.8	-	-	-	-	0.85	N/A	

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
0GF - ofc1		95	-	-
0GF - workshop		95	-	-
0GF - services		95	-	-
0GF - ofc2		95	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0GF - ofc1	NO (-0.6%)	NO
0GF - workshop	NO (-47.4%)	NO
0GF - services	N/A	N/A
0GF - ofc2	YES (+59.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	1537.2	1537.2
External area [m ²]	3768	3768
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	25	5
Average conductance [W/K]	1238.01	1170.92
Average U-value [W/m ² K]	0.33	0.31
Alpha value* [%]	12.54	28.34

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	17.36	6.23
Cooling	1.63	2.2
Auxiliary	1.47	1.03
Lighting	10.8	4.6
Hot water	1.69	1.69
Equipment*	18.99	18.99
TOTAL **	32.94	15.75

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	174.96	94.03
Primary energy [kWh _{PE} /m ²]	49.62	23.66
Total emissions [kg/m ²]	4.73	2.25

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	161.8	13.1	17.4	1.6	1.5	2.59	2.24	2.64	3
	Notional	59.2	34.8	6.2	2.2	1	2.64	4.4	----	----

Key to terms	
Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Project name

Be Lean

As designed

Date: Tue Apr 09 18:17:22 2024

Administrative information

Building Details

Address: Commercial Building, 30 - 48 Lawrence Road,
London, N15 4EG

Certifier details

Name: Ondrej Gajdos

Telephone number: 02080995978

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 768.58The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	2.25
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.14
Target primary energy rate (TPER), kWh _{PE} /m ² annum	23.66
Building primary energy rate (BPER), kWh _{PE} /m ² annum	33.12
Do the building's emission and primary energy rates exceed the targets?	BER > TER BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.47	0.55	0GF - warehouse_W_8
Floors	0.18	0.19	0.21	0GF - warehouse_S_2
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.16	0.16	0GF - ofc1_R_3
Windows** and roof windows	1.6	1.4	1.4	0GF - ofc1_G_6
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	7

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Split

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	7	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Project DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
0GF - ofc1	-	-	-	-	0.8	-	-	-	-		0.85	N/A
0GF - warehouse	-	-	-	-	0.8	-	-	-	-		0.85	N/A
0GF - services	-	-	-	-	0.8	-	-	-	-		0.85	N/A
0GF - ofc2	-	-	-	-	0.8	-	-	-	-		0.85	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
0GF - ofc1		120	-	-
0GF - warehouse		120	-	-
0GF - services		120	-	-
0GF - ofc2		120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0GF - ofc1	NO (-0.6%)	NO
0GF - warehouse	NO (-47.4%)	NO
0GF - services	N/A	N/A
0GF - ofc2	YES (+59.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	1537.2	1537.2
External area [m ²]	3768	3768
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	7	5
Average conductance [W/K]	1189.69	1170.92
Average U-value [W/m ² K]	0.32	0.31
Alpha value* [%]	13.05	28.34

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	9.19	6.23
Cooling	1.15	2.2
Auxiliary	1.47	1.03
Lighting	8.58	4.6
Hot water	1.69	1.69
Equipment*	18.99	18.99
TOTAL **	22.07	15.75

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	107.29	94.03
Primary energy [kWh _{PE} /m ²]	33.12	23.66
Total emissions [kg/m ²]	3.14	2.25

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	85.6	21.6	9.2	1.1	1.5	2.59	5.23	2.64	7
	Notional	59.2	34.8	6.2	2.2	1	2.64	4.4	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Be Green**As designed****Date:** Tue Apr 09 18:14:59 2024

Administrative information

Building Details

Address: Commercial Building, 30 - 48 Lawrence Road,
London, N15 4EG

Certifier details

Name: Ondrej Gajdos**Telephone number:** 02080995978**Address:** , ,

Certification tool

Calculation engine: SBEM**Calculation engine version:** v6.1.e.0**Interface to calculation engine:** DesignBuilder SBEM**Interface to calculation engine version:** v7.2.0**BRUKL compliance module version:** v6.1.e.1**Foundation area [m²]:** 768.58The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	2.25
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	-0.62
Target primary energy rate (TPER), kWh _{PE} /m ² annum	23.66
Building primary energy rate (BPER), kWh _{PE} /m ² annum	-9.48
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.47	0.55	0GF - warehouse_W_8
Floors	0.18	0.19	0.21	0GF - warehouse_S_2
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.16	0.16	0GF - ofc1_R_3
Windows** and roof windows	1.6	1.4	1.4	0GF - ofc1_G_6
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	7

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Split

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	7	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Project DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
0GF - ofc1		-	-	-	-	0.8	-	-	-	-	0.85	N/A
0GF - warehouse		-	-	-	-	0.8	-	-	-	-	0.85	N/A
0GF - services		-	-	-	-	0.8	-	-	-	-	0.85	N/A
0GF - ofc2		-	-	-	-	0.8	-	-	-	-	0.85	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
0GF - ofc1		120	-	-
0GF - warehouse		120	-	-
0GF - services		120	-	-
0GF - ofc2		120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0GF - ofc1	NO (-0.6%)	NO
0GF - warehouse	NO (-47.4%)	NO
0GF - services	N/A	N/A
0GF - ofc2	YES (+59.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	1537.2	1537.2
External area [m ²]	3768	3768
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	7	5
Average conductance [W/K]	1189.69	1170.92
Average U-value [W/m ² K]	0.32	0.31
Alpha value* [%]	13.05	28.34

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	6.06	6.23
Cooling	1.15	2.2
Auxiliary	1.47	1.03
Lighting	8.58	4.6
Hot water	1.69	1.69
Equipment*	18.99	18.99
TOTAL **	18.95	15.75

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	25.75	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>25.75</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	107.29	94.03
Primary energy [kWh _{PE} /m ²]	-9.48	23.66
Total emissions [kg/m ²]	-0.62	2.25

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	85.6	21.6	6.1	1.1	1.5	3.92	5.23	4	7
Notional	59.2	34.8	6.2	2.2	1	2.64	4.4	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type