

Full SAP Calculation Printout



Plot Reference	UNIT 06			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 06		
Plot Address	UNIT 06, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	82 B	DER	3.43	TER	13.67
Environmental	97 A	% DER < TER			74.91
CO ₂ Emissions (t/year)	0.2	DFEE	25.54	TFEE	29.17
Compliance Check	See BREL	% DFEE < TFEE			12.44
% DPER < TPER	49.77	DPER	36.99	TPER	73.64
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.2000 (1b)	2.8000 (2b)	174.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.2000		174.1600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	174.1600 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	4	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1050 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1339	0.1313	0.1286	0.1155	0.1129	0.0997	0.0997	0.0971	0.1050	0.1129	0.1181	0.1234 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.2289	0.2262	0.2236	0.2105	0.2079	0.1947	0.1947	0.1921	0.2000	0.2079	0.2131	0.2184 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
dl			2.1000	1.0000	2.1000		(26)
l			12.9200	0.7940	10.2579		(27)
exposed floor			8.2000	0.0900	0.7380	75.0000	615.0000 (28b)
exposed wall	40.0400	12.9200	27.1200	0.1500	4.0680	60.0000	1627.2001 (29a)
corridor wall	17.9200	2.1000	15.8200	0.2500	3.9550	9.0000	142.3800 (29a)
corridor above	4.9000		4.9000	0.0900	0.4410	9.0000	44.1000 (30)
Total net area of external elements Aum(A, m ²)			71.0600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	21.5599	(33)
Main dwelling							
pw			45.6400	0.0000	0.0000	110.0000	5020.3999 (32)
pf			54.0000			40.0000	2160.0000 (32d)
pc			57.3000			30.0000	1719.0000 (32b)
iw			98.5600			9.0000	887.0400 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 12215.1199 (34)

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

196.3846 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.7000	0.0500	0.2850
E3 Sill	4.7000	0.0500	0.2350
E4 Jamb	26.2000	0.0500	1.3100
E20 Exposed floor (normal)	4.0000	0.3200	1.2800
E21 Exposed floor (inverted)	10.4000	0.3200	3.3280
E7 Party floor between dwellings (in blocks of flats)	10.8000	0.0700	0.7560
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	1.9000	0.0200	0.0380
E16 Corner (normal)	11.2000	0.0900	1.0080
E17 Corner (inverted - internal area greater than external area)	11.2000	-0.0900	-1.0080
E18 Party wall between dwellings	5.6000	0.0600	0.3360
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.5680 (36)
Point Thermal Bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	29.1279 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	13.1541	13.0032	12.8524	12.0980	11.9472	11.1928	11.1928	11.0420	11.4946	11.9472	12.2489	12.5506	(38)
Heat transfer coeff	42.2820	42.1312	41.9803	41.2260	41.0751	40.3208	40.3208	40.1699	40.6225	41.0751	41.3768	41.6786	(39)
Average = Sum(39)m / 12 =												41.1882	
HLP	0.6798	0.6773	0.6749	0.6628	0.6604	0.6482	0.6482	0.6458	0.6531	0.6604	0.6652	0.6701	(40)
HLP (average)												0.6622	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0431 (42)
Hot water usage for mixer showers	58.4757	57.5970	56.3164	53.8663	52.0582	50.0418	48.8957	50.1665	51.5596	53.7246	56.2274	58.2517	(42a)
Hot water usage for baths	25.2697	24.8944	24.3659	23.3915	22.6618	21.8528	21.4158	21.9406	22.5120	23.3777	24.3722	25.1843	(42b)
Hot water usage for other uses	35.5534	34.2606	32.9677	31.6749	30.3820	29.0892	29.0892	30.3820	31.6749	32.9677	34.2606	35.5534	(42c)
Average daily hot water use (litres/day)												109.6630	(43)
Daily hot water use	119.2989	116.7520	113.6501	108.9327	105.1021	100.9838	99.4006	102.4891	105.7465	110.0700	114.8601	118.9894	(44)
Energy conte	188.9403	166.2532	174.6759	149.1234	141.4876	124.1713	120.2164	126.9030	130.3960	149.3640	163.6393	186.3087	(45)
Energy content (annual)										Total = Sum(45)m =		1821.4791	
Distribution loss (46)m = 0.15 x (45)m	28.3410	24.9380	26.2014	22.3685	21.2231	18.6257	18.0325	19.0354	19.5594	22.4046	24.5459	27.9463	(46)
Water storage loss (or HIU loss):													
Store volume												110.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												1.0294	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.0327	(55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	244.2171	216.1807	229.9527	202.6171	196.7644	177.6650	175.4932	182.1798	183.8897	204.6408	217.1330	241.5855	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	244.2171	216.1807	229.9527	202.6171	196.7644	177.6650	175.4932	182.1798	183.8897	204.6408	217.1330	241.5855	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2472.3188	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	107.0441	95.2211	102.3012	92.3785	91.2661	84.0819	84.1934	86.4167	86.1516	93.8850	97.2050	106.1691	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.3324	100.0109	90.3324	93.3435	90.3324	93.3435	90.3324	90.3324	93.3435	90.3324	93.3435	90.3324	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	178.4593	180.3112	175.6446	165.7099	153.1692	141.3827	133.5086	131.6568	136.3234	146.2580	158.7987	170.5852	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	(71)
Water heating gains (Table 5)	143.8764	141.6981	137.5016	128.3034	122.6694	116.7804	113.1632	116.1514	119.6550	126.1895	135.0070	142.7004	(72)
Total internal gains	466.3148	475.6668	457.1252	441.0034	419.8177	405.1532	390.6508	391.7872	402.9685	416.4265	440.7958	457.2646	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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Southeast			7.5600	36.7938	0.5300	0.7000	0.7700	71.5161 (77)				
Southwest			5.3600	36.7938	0.5300	0.7000	0.7700	50.7045 (79)				
Solar gains	122.2207	208.1870	284.8506	352.9436	395.3263	392.4675	378.3806	346.7612	308.4329	230.0910	146.3922	104.5954 (83)
Total gains	588.5354	683.8538	741.9757	793.9471	815.1440	797.6208	769.0314	738.5484	711.4014	646.5175	587.1880	561.8600 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	80.2490	80.5363	80.8258	82.3047	82.6070	84.1524	84.1524	84.4684	83.5273	82.6070	82.0046	81.4109
alpha	6.3499	6.3691	6.3884	6.4870	6.5071	6.6102	6.6102	6.6312	6.5685	6.5071	6.4670	6.4274
util living area	0.9290	0.8608	0.7663	0.6165	0.4668	0.3234	0.2307	0.2502	0.3935	0.6449	0.8569	0.9404 (86)
MIT	20.6313	20.7924	20.9069	20.9782	20.9966	20.9998	21.0000	21.0000	20.9991	20.9762	20.8329	20.6014 (87)
Th 2	20.3587	20.3609	20.3630	20.3738	20.3760	20.3868	20.3868	20.3889	20.3824	20.3760	20.3717	20.3673 (88)
util rest of house	0.9174	0.8424	0.7414	0.5872	0.4361	0.2925	0.1985	0.2170	0.3585	0.6102	0.8354	0.9302 (89)
MIT 2	19.9457	20.1371	20.2682	20.3536	20.3732	20.3866	20.3868	20.3889	20.3819	20.3549	20.1970	19.9174 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.2709	20.4479	20.5712	20.6498	20.6689	20.6774	20.6776	20.6787	20.6746	20.6496	20.4986	20.2418 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.2709	20.4479	20.5712	20.6498	20.6689	20.6774	20.6776	20.6787	20.6746	20.6496	20.4986	20.2418 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9156	0.8450	0.7497	0.6002	0.4505	0.3071	0.2138	0.2327	0.3750	0.6256	0.8399	0.9280 (94)
Useful gains	538.8849	577.8605	556.2515	476.5456	367.2440	244.9770	164.4071	171.8677	266.8097	404.4480	493.1993	521.4220 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	675.2808	655.0509	590.7112	484.3976	368.3971	245.0464	164.4119	171.8760	267.0775	412.7876	554.3910	668.6003 (97)
Space heating kWh	101.4786	51.8719	25.6380	5.6535	0.8578	0.0000	0.0000	0.0000	0.0000	6.2047	44.0581	109.5007 (98a)
Space heating requirement - total per year (kWh/year)												345.2633
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	101.4786	51.8719	25.6380	5.6535	0.8578	0.0000	0.0000	0.0000	0.0000	6.2047	44.0581	109.5007 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												345.2633
Space heating per m2	(98c) / (4) =											5.5509 (99)
9b. Energy requirements												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Heat pump-Space and Water												1.0000 (303a)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement												
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	152.2178	77.8079	38.4570	8.4802	1.2868	0.0000	0.0000	0.0000	0.0000	9.3071	66.0871	164.2510
Space heating requirement	152.2178	77.8079	38.4570	8.4802	1.2868	0.0000	0.0000	0.0000	0.0000	9.3071	66.0871	164.2510 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement												
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	366.3256	324.2710	344.9291	303.9256	295.1466	266.4975	263.2399	273.2696	275.8345	306.9612	325.6995	362.3782
Water heating fuel	366.3256	324.2710	344.9291	303.9256	295.1466	266.4975	263.2399	273.2696	275.8345	306.9612	325.6995	362.3782 (310)
Cooling System Energy Efficiency Ratio	0.0000 (314)											
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	12.5058	11.2955	12.5058	12.1024	12.5058	12.1024	12.5058	12.5058	12.1024	12.5058	12.1024	12.5058 (331)
Lighting	18.7693	15.0574	13.5575	9.9328	7.6724	6.2684	6.9990	9.0976	11.8169	15.5044	17.5122	19.2909 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.6420	-4.7219	-8.7807	-12.4672	-15.6936	-15.5195	-15.1892	-13.0138	-9.7132	-6.1843	-3.1812	-2.1541 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	-0.2982	-0.7939	-2.0757	-3.9488	-6.0193	-6.3685	-6.1845	-4.7410	-2.8724	-1.2795	-0.4304	-0.2208 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												517.8949 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3708.4783 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												5.1789 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6930)												
mechanical ventilation fans (SFP = 0.6930)												147.2453 (330a)
Total electricity for the above, kWh/year												147.2453 (331)
Electricity for lighting (calculated in Appendix L)												151.4789 (332)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	-144.4936 (333)
Wind generation	0.0000 (334)
Hydro-electric generation (Appendix N)	0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (335)
Appendix Q - special features	
Energy saved or generated	-0.0000 (336)
Energy used	0.0000 (337)
Total delivered energy for all uses	4380.6038 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			330.0000 (367)
Space and Water heating from Heat pump	1280.7191	0.1594	25.0137 (367)
Electrical energy for heat distribution (space & water)	5.1789	0.0000	6.0479 (372)
Overall CO2 factor for heat network			0.0448 (386)
Total CO2 associated with community systems			189.3166 (373)
Space and water heating			189.3166 (376)
Pumps, fans and electric keep-hot	147.2453	0.1387	20.4247 (378)
Energy for lighting	151.4789	0.1443	21.8631 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-109.2607	0.1304	-14.2474
PV Unit electricity exported	-35.2330	0.1205	-4.2469
Total			-18.4943 (380)
Total CO2, kg/year			213.1101 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4300 (384)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Heat pump			330.0000 (467a)
Space and Water heating from Heat pump	1280.7191	1.5899	249.5181 (467)
Electrical energy for heat distribution (space & water)	5.1789	0.0000	64.6293 (472)
Overall CO2 factor for heat network			0.4787 (486)
Total CO2 associated with community systems			2023.0943 (473)
Space and water heating			2023.0943 (476)
Pumps, fans and electric keep-hot	147.2453	1.5128	222.7527 (478)
Energy for lighting	151.4789	1.5338	232.3435 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-109.2607	1.4817	-161.8897
PV Unit electricity exported	-35.2330	0.4422	-15.5792
Total			-177.4689 (480)
Total Primary energy kWh/year			2300.7216 (483)
Dwelling Primary energy Rate (DPER)			36.9900 (484)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.2000 (1b)	x 2.8000 (2b)	= 174.1600 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.1600 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1148 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3648 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2554 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)

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Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3256	0.3192	0.3128	0.2809	0.2745	0.2426	0.2426	0.2362	0.2554	0.2745	0.2873	0.3001 (22b)
Effective ac	0.5530	0.5510	0.5489	0.5395	0.5377	0.5294	0.5294	0.5279	0.5326	0.5377	0.5413	0.5450 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type			12.9200	1.1450	14.7939		(27)
exposed floor			8.2000	0.1300	1.0660		(28b)
exposed wall	40.0400	12.9200	27.1200	0.1800	4.8816		(29a)
corridor wall	17.9200	2.1000	15.8200	0.1800	2.8476		(29a)
corridor above	4.9000		4.9000	0.1100	0.5390		(30)
Total net area of external elements Aum(A, m2)			71.0600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	26.2281	(33)
Main dwelling							
pw			45.6400	0.0000	0.0000		(32)

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

196.3846 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.7000	0.0500	0.2850
E3 Sill	4.7000	0.0500	0.2350
E4 Jamb	26.2000	0.0500	1.3100
E20 Exposed floor (normal)	4.0000	0.3200	1.2800
E21 Exposed floor (inverted)	10.4000	0.3200	3.3280
E7 Party floor between dwellings (in blocks of flats)	10.8000	0.0700	0.7560
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	1.9000	0.0200	0.0380
E16 Corner (normal)	11.2000	0.0900	1.0080
E17 Corner (inverted - internal area greater than external area)	11.2000	-0.0900	-1.0080
E18 Party wall between dwellings	5.6000	0.0600	0.3360

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

7.5680 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 33.7961 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	31.7832	31.6649	31.5489	31.0042	30.9023	30.4279	30.4279	30.3400	30.6106	30.9023	31.1085	31.3240 (38)
Heat transfer coeff	65.5793	65.4610	65.3450	64.8003	64.6984	64.2240	64.2240	64.1361	64.4067	64.6984	64.9046	65.1201 (39)
Average = Sum(39)m / 12 =												64.7998

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0543	1.0524	1.0506	1.0418	1.0402	1.0325	1.0325	1.0311	1.0355	1.0402	1.0435	1.0469 (40)
HLP (average)												1.0418
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0431 (42)
Hot water usage for mixer showers												
58.4757	57.5970	56.3164	53.8663	52.0582	50.0418	48.8957	50.1665	51.5596	53.7246	56.2274	58.2517 (42a)	
Hot water usage for baths												
25.2697	24.8944	24.3659	23.3915	22.6618	21.8528	21.4158	21.9406	22.5120	23.3777	24.3722	25.1843 (42b)	
Hot water usage for other uses												
35.5534	34.2606	32.9677	31.6749	30.3820	29.0892	29.0892	30.3820	31.6749	32.9677	34.2606	35.5534 (42c)	
Average daily hot water use (litres/day)												109.6630 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
Energy content (annual)	119.2989	116.7520	113.6501	108.9327	105.1021	100.9838	99.4006	102.4891	105.7465	110.0700	114.8601	118.9894 (44)
Distribution loss (46)m = 0.15 x (45)m	188.9403	166.2532	174.6759	149.1234	141.4876	124.1713	120.2164	126.9030	130.3960	149.3640	163.6393	186.3087 (45)
Total storage loss										Total = Sum(45)m =		1821.4791
Water storage loss (or HIU loss):	28.3410	24.9380	26.2014	22.3685	21.2231	18.6257	18.0325	19.0354	19.5594	22.4046	24.5459	27.9463 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.6535	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	239.8992	212.2806	225.6348	198.4385	192.4465	173.4864	170.8699	177.8619	179.7111	200.3229	212.9544	237.2676 (62)
WWHRS	-26.7327	-23.6426	-24.7572	-20.4999	-19.1052	-16.3484	-15.3240	-16.2956	-16.9147	-19.9406	-22.5903	-26.2376 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	213.1665	188.6380	200.8777	177.9386	173.3413	157.1380	155.5459	161.5663	162.7963	180.3823	190.3641	211.0299 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2172.7849 (64)
	2173 (64)											

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552	102.1552 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.3324	100.0109	90.3324	93.3435	90.3324	93.3435	90.3324	90.3324	93.3435	90.3324	93.3435	90.3324 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	178.4593	180.3112	175.6446	165.7099	153.1692	141.3827	133.5086	131.6568	136.3234	146.2580	158.7987	170.5852 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155	33.2155 (69)

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Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	-81.7242	(71)
Water heating gains (Table 5)	101.5623	99.3840	95.1875	85.9893	80.3553	74.4663	70.7464	73.8373	77.3409	83.8754	92.6928	100.3862 (72)
Total internal gains	427.0006	436.3526	417.8110	401.6893	380.5035	362.8391	348.2341	349.4731	360.6544	377.1124	401.4816	417.9504 (73)

6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Southeast			7.5600	36.7938	0.6300	0.7000	0.7700	85.0097 (77)				
Southwest			5.3600	36.7938	0.6300	0.7000	0.7700	60.2715 (79)				
Solar gains	145.2812	247.4676	338.5960	419.5368	469.9162	466.5180	449.7731	412.1879	366.6278	273.5044	174.0134	124.3304 (83)
Total gains	572.2818	683.8202	756.4070	821.2261	850.4197	829.3571	798.0072	761.6610	727.2822	650.6168	575.4950	542.2809 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.7402	51.8337	51.9257	52.3622	52.4447	52.8321	52.8321	52.9045	52.6822	52.4447	52.2781	52.1051
alpha	4.4493	4.4556	4.4617	4.4908	4.4963	4.5221	4.5221	4.5270	4.5121	4.4963	4.4852	4.4737
util living area	0.9726	0.9436	0.8957	0.7985	0.6562	0.4849	0.3520	0.3841	0.5835	0.8315	0.9473	0.9777 (86)
MIT	19.8584	20.1333	20.4272	20.7271	20.9072	20.9811	20.9964	20.9947	20.9573	20.7196	20.2414	19.8028 (87)
Th 2	20.0383	20.0399	20.0414	20.0486	20.0500	20.0563	20.0563	20.0575	20.0539	20.0500	20.0473	20.0444 (88)
util rest of house	0.9663	0.9316	0.8747	0.7619	0.6024	0.4175	0.2775	0.3069	0.5130	0.7917	0.9340	0.9725 (89)
MIT 2	18.7352	19.0766	19.4337	19.7848	19.9738	20.0450	20.0550	20.0553	20.0255	19.7873	19.2216	18.6701 (90)
Living area fraction	fLA = Living area / (4) = 0.4743 (91)											
MIT	19.2679	19.5778	19.9049	20.2317	20.4165	20.4890	20.5015	20.5009	20.4674	20.2295	19.7053	19.2073 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2679	19.5778	19.9049	20.2317	20.4165	20.4890	20.5015	20.5009	20.4674	20.2295	19.7053	19.2073 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9601	0.9249	0.8714	0.7694	0.6238	0.4488	0.3128	0.3435	0.5445	0.7999	0.9284	0.9668 (94)
Ext temp.	549.4388	632.4695	659.1085	631.8400	530.4814	372.2297	249.6545	261.6110	396.0214	520.4226	534.2817	524.2510 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	981.5831	960.8207	875.9430	734.2993	563.9415	378.2133	250.5685	263.0130	410.1047	623.0116	818.1409	977.2781 (97)
Space heating requirement - total per year (kWh/year)	321.5153	220.6520	161.3249	73.7707	24.8944	0.0000	0.0000	0.0000	0.0000	76.3262	204.3786	337.0522 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	321.5153	220.6520	161.3249	73.7707	24.8944	0.0000	0.0000	0.0000	0.0000	76.3262	204.3786	337.0522 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m2	(98c) / (4) = 22.8282 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.4000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	321.5153	220.6520	161.3249	73.7707	24.8944	0.0000	0.0000	0.0000	0.0000	76.3262	204.3786	337.0522 (98)
Space heating fuel (main heating system)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating efficiency (main heating system 2)	347.9603	238.8009	174.5941	79.8384	26.9420	0.0000	0.0000	0.0000	0.0000	82.6041	221.1889	364.7751 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	213.1665	188.6380	200.8777	177.9386	173.3413	157.1380	155.5459	161.5663	162.7963	180.3823	190.3641	211.0299 (64)
Efficiency of water heater (217)m	85.2596	84.7183	83.9157	82.6431	81.2875	80.3000	80.3000	80.3000	80.3000	82.6780	84.5340	85.3793 (217)
Fuel for water heating, kWh/month	250.0205	222.6652	239.3804	215.3097	213.2447	195.6886	193.7059	201.2033	202.7352	218.1744	225.1924	247.1677 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	18.7693	15.0574	13.5575	9.9328	7.6724	6.2684	6.9990	9.0976	11.8169	15.5044	17.5122	19.2909 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-10.3247	-15.7550	-24.4898	-29.8531	-34.2851	-32.7847	-32.3920	-29.5263	-24.8704	-18.9959	-11.7698	-8.7925 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												

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(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-2.6857	-5.8466	-11.9984	-18.5921	-25.1545	-25.4819	-25.1775	-21.0492	-15.0850	-8.5381	-3.6412	-2.1092	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1536.7038	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2624.4880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												151.4789	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-439.1987	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3959.4721	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1536.7038	0.2100	322.7078	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2624.4880	0.2100	551.1425	(264)
Space and water heating			873.8503	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	151.4789	0.1443	21.8631	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-273.8393	0.1330	-36.4100	
PV Unit electricity exported	-165.3594	0.1250	-20.6700	
Total			-57.0799	(269)
Total CO2, kg/year			850.5627	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.6700	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1536.7038	1.1300	1736.4753	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2624.4880	1.1300	2965.6715	(278)
Space and water heating			4702.1468	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	151.4789	1.5338	232.3435	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-273.8393	1.4913	-408.3788	
PV Unit electricity exported	-165.3594	0.4588	-75.8658	
Total			-484.2446	(283)
Total Primary energy kWh/year			4580.3465	(286)
Target Primary Energy Rate (TPER)			73.6400	(287)