

Full SAP Calculation Printout



Plot Reference	UNIT 01			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 01		
Plot Address	UNIT 01, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	82 B	DER	3.51	TER	14.21
Environmental	97 A	% DER < TER			75.30
CO ₂ Emissions (t/year)	0.26	DFEE	34.79	TFEE	40.63
Compliance Check	See BREL	% DFEE < TFEE			14.39
% DPER < TPER	50.65	DPER	37.51	TPER	76.01
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	79.0000 (1b)	3.0000 (2b)	237.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		237.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	237.0000 (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							
1			21.8900	0.7940	17.3797		(27)
ground floor			79.0000	0.1000	7.9000	110.0000	8690.0000 (28a)
exposed wall	44.4000	21.8900	22.5100	0.1500	3.3765	60.0000	1350.6001 (29a)
stair wall	20.7000		20.7000	0.1700	3.5190	9.0000	186.3000 (29a)
corridor wall	16.2000		16.2000	0.2500	4.0500	9.0000	145.8000 (29a)
Total net area of external elements Aum(A, m ²)			160.3000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2252		(33)
Main dwelling							
pw			38.4000	0.0000	0.0000	110.0000	4224.0002 (32)
pc			79.0000			30.0000	2370.0000 (32b)
iw			176.4000			9.0000	1587.5999 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	18554.3002 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							234.8646 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.2000	0.0500	0.4100
E3 Sill	8.2000	0.0500	0.4100
E4 Jamb	19.4800	0.0500	0.9740
E5 Ground floor (normal)	14.9000	0.1600	2.3840
E7 Party floor between dwellings (in blocks of flats)	28.0000	0.0700	1.9600
E16 Corner (normal)	12.0000	0.0900	1.0800
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E25 Staggered party wall between dwellings	3.0000	0.0600	0.1800

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.7680 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 42.9932 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	17.9003	17.6950	17.4897	16.4632	16.2579	15.2314	15.2314	15.0261	15.6420	16.2579	16.6685	17.0791 (38)
Heat transfer coeff	60.8936	60.6883	60.4830	59.4564	59.2511	58.2246	58.2246	58.0193	58.6352	59.2511	59.6618	60.0724 (39)
Average = Sum(39)m / 12 =												59.4051

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7708	0.7682	0.7656	0.7526	0.7500	0.7370	0.7370	0.7344	0.7422	0.7500	0.7552	0.7604 (40)
HLP (average)												0.7520
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4436 (42)
Hot water usage for mixer showers													
65.1911	64.2114	62.7838	60.0523	58.0365	55.7886	54.5108	55.9276	57.4807	59.8943	62.6845	64.9413	64.9413 (42a)	
Hot water usage for baths													
28.1575	27.7393	27.1505	26.0647	25.2516	24.3501	23.8631	24.4479	25.0846	26.0493	27.1574	28.0623	28.0623 (42b)	
Hot water usage for other uses													
39.6550	38.2130	36.7710	35.3290	33.8870	32.4450	32.4450	33.8870	35.3290	36.7710	38.2130	39.6550	39.6550 (42c)	
Average daily hot water use (litres/day)													122.2605 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.0036	130.1637	126.7052	121.4460	117.1752	112.5837	110.8190	114.2626	117.8944	122.7147	128.0550	132.6587	(44)
Energy conte	210.6452	185.3514	194.7412	166.2535	157.7403	138.4348	134.0260	141.4810	145.3756	166.5226	182.4378	207.7114	(45)
Energy content (annual)										Total = Sum(45)m =		2030.7208	
Distribution loss (46)m = 0.15 x (45)m													
31.5968	27.8027	29.2112	24.9380	23.6611	20.7652	20.1039	21.2221	21.8063	24.9784	27.3657	31.1567	31.1567	(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	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	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													
265.9220	235.2789	250.0180	219.7472	213.0171	191.9285	189.3028	196.7578	198.8692	221.7994	235.9314	262.9882	262.9882	(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													
265.9220	235.2789	250.0180	219.7472	213.0171	191.9285	189.3028	196.7578	198.8692	221.7994	235.9314	262.9882	262.9882	(64)
12Total per year (kWh/year)													
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)

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	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.6220	121.3672	109.6220	113.2761	109.6220	113.2761	109.6220	109.6220	113.2761	109.6220	113.2761	109.6220 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.3379	219.5931	213.9099	201.8109	186.5382	172.1839	162.5944	160.3391	166.0223	178.1213	193.3941	207.7483 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181 (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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	153.5766	151.1478	146.4690	136.2142	129.9329	123.3674	119.3348	122.6665	126.5727	133.8578	143.6882	152.2654 (72)
Total internal gains	540.1906	551.7623	529.6550	510.9554	485.7473	468.4815	451.2054	452.2818	465.5253	481.2553	510.0125	529.2899 (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
Northeast	9.8900	11.2829	0.5300	0.7000	0.7700	28.6897 (75)
East	12.0000	19.6403	0.5300	0.7000	0.7700	60.5948 (76)

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Solar gains	89.2845	176.9350	300.4284	457.5005	581.1876	604.8036	571.6967	476.7693	355.2474	212.0212	111.6537	73.2597 (83)
Total gains	629.4751	728.6974	830.0834	968.4558	1066.9348	1073.2852	1022.9021	929.0511	820.7726	693.2765	621.6662	602.5496 (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	84.6390	84.9254	85.2136	86.6848	86.9852	88.5187	88.5187	88.8320	87.8989	86.9852	86.3865	85.7961
alpha	6.6426	6.6617	6.6809	6.7790	6.7990	6.9012	6.9012	6.9221	6.8599	6.7990	6.7591	6.7197
util living area	0.9838	0.9597	0.8924	0.7146	0.5137	0.3470	0.2504	0.2872	0.4910	0.8151	0.9600	0.9872 (86)
MIT	20.3890	20.5730	20.7905	20.9578	20.9954	20.9997	21.0000	20.9999	20.9975	20.9211	20.6416	20.3619 (87)
Th 2	20.2787	20.2810	20.2832	20.2946	20.2969	20.3082	20.3082	20.3105	20.3037	20.2969	20.2923	20.2878 (88)
util rest of house	0.9797	0.9504	0.8717	0.6797	0.4758	0.3096	0.2111	0.2442	0.4423	0.7773	0.9492	0.9838 (89)
MIT 2	19.5762	19.8058	20.0659	20.2565	20.2934	20.3081	20.3082	20.3105	20.3022	20.2262	19.9026	19.5495 (90)
Living area fraction	19.8272	20.0427	20.2897	20.4731	20.5102	20.5217	20.5219	20.5234	20.5169	fLA = Living area / (4) =	20.1309	19.8004 (92)
MIT	19.8272	20.0427	20.2897	20.4731	20.5102	20.5217	20.5219	20.5234	20.5169	20.4408	20.1309	19.8004 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8272	20.0427	20.2897	20.4731	20.5102	20.5217	20.5219	20.5234	20.5169	20.4408	20.1309	19.8004 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9765	0.9469	0.8719	0.6887	0.4873	0.3212	0.2232	0.2575	0.4572	0.7854	0.9463	0.9810 (94)
Useful gains	614.7108	689.9870	723.7224	666.9789	519.9412	344.6980	228.3450	239.2249	375.2896	544.5174	588.3017	591.1118 (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	945.5085	918.9866	834.0426	688.0946	522.0149	344.7904	228.3506	239.2397	376.2587	583.0801	777.4454	937.1538 (97)
Space heating kWh	246.1135	153.8878	82.0782	15.2033	1.5428	0.0000	0.0000	0.0000	0.0000	28.6906	136.1834	257.4553 (98a)
Space heating requirement - total per year (kWh/year)												921.1550
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	246.1135	153.8878	82.0782	15.2033	1.5428	0.0000	0.0000	0.0000	0.0000	28.6906	136.1834	257.4553 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												921.1550
Space heating per m2										(98c) / (4) =		11.6602 (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												
	246.1135	153.8878	82.0782	15.2033	1.5428	0.0000	0.0000	0.0000	0.0000	28.6906	136.1834	257.4553 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	369.1702	230.8316	123.1173	22.8050	2.3142	0.0000	0.0000	0.0000	0.0000	43.0360	204.2752	386.1829
Space heating requirement												
	369.1702	230.8316	123.1173	22.8050	2.3142	0.0000	0.0000	0.0000	0.0000	43.0360	204.2752	386.1829 (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												
	265.9220	235.2789	250.0180	219.7472	213.0171	191.9285	189.3028	196.7578	198.8692	221.7994	235.9314	262.9882 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	398.8830	352.9183	375.0271	329.6207	319.5257	287.8927	283.9542	295.1366	298.3039	332.6991	353.8972	394.4823
Water heating fuel												
	398.8830	352.9183	375.0271	329.6207	319.5257	287.8927	283.9542	295.1366	298.3039	332.6991	353.8972	394.4823 (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	17.0181	15.3712	17.0181	16.4691	17.0181	16.4691	17.0181	17.0181	16.4691	17.0181	16.4691	17.0181 (331)
Lighting	22.7773	18.2728	16.4526	12.0539	9.3108	7.6070	8.4936	11.0403	14.3403	18.8152	21.2517	23.4103 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-3.3300	-5.9456	-11.0433	-15.6590	-19.6907	-19.4636	-19.0496	-16.3318	-12.2031	-7.7813	-4.0078	-2.7155 (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	-0.3840	-1.0217	-2.6701	-5.0770	-7.7361	-8.1844	-7.9487	-6.0953	-3.6945	-1.6467	-0.5541	-0.2843 (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												1381.7324 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												4022.3409 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												13.8173 (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)												200.3740 (330a)
Total electricity for the above, kWh/year												200.3740 (331)
Electricity for lighting (calculated in Appendix L)												183.8257 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-182.5183 (333)

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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	5605.7548 (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	1637.5980	0.1586	66.4114 (367)
Electrical energy for heat distribution (space & water)	13.8173	0.0000	7.8584 (372)
Overall CO2 factor for heat network			0.0455 (386)
Total CO2 associated with community systems			245.9903 (373)
Space and water heating			245.9903 (376)
Pumps, fans and electric keep-hot	200.3740	0.1387	27.7943 (378)
Energy for lighting	183.8257	0.1443	26.5317 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.2211	0.1304	-17.8962
PV Unit electricity exported	-45.2972	0.1205	-5.4604
Total			-23.3566 (380)
Total CO2, kg/year			276.9597 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5100 (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	1637.5980	1.5871	664.5244 (467)
Electrical energy for heat distribution (space & water)	13.8173	0.0000	83.1064 (472)
Overall CO2 factor for heat network			0.4814 (486)
Total CO2 associated with community systems			2601.4812 (473)
Space and water heating			2601.4812 (476)
Pumps, fans and electric keep-hot	200.3740	1.5128	303.1258 (478)
Energy for lighting	183.8257	1.5338	281.9580 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.2211	1.4818	-203.3290
PV Unit electricity exported	-45.2972	0.4422	-20.0308
Total			-223.3597 (480)
Total Primary energy kWh/year			2963.2054 (483)
Dwelling Primary energy Rate (DPER)			37.5100 (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	79.0000 (1b)	x 3.0000 (2b)	= 237.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	237.0000 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1266 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3766 (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) = 0.2636 (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	0.3361	0.3295	0.3229	0.2900	0.2834	0.2504	0.2504	0.2438	0.2636	0.2834	0.2966	0.3097 (22b)

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Effective ac 0.5565 0.5543 0.5521 0.5420 0.5402 0.5314 0.5314 0.5297 0.5347 0.5402 0.5440 0.5480 (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 Opening Type			19.7500	1.1450	22.6145			(27)
ground floor			79.0000	0.1300	10.2700			(28a)
exposed wall	44.4000	19.7500	24.6500	0.1800	4.4370			(29a)
stair wall	20.7000		20.7000	0.1800	3.7260			(29a)
corridor wall	16.2000		16.2000	0.1800	2.9160			(29a)
Total net area of external elements Aum(A, m2)			160.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		43.9635			(33)
Main dwelling								
pw			38.4000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 234.8646 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.2000	0.0500	0.4100	
E3 Sill	8.2000	0.0500	0.4100	
E4 Jamb	19.4800	0.0500	0.9740	
E5 Ground floor (normal)	14.9000	0.1600	2.3840	
E7 Party floor between dwellings (in blocks of flats)	28.0000	0.0700	1.9600	
E16 Corner (normal)	12.0000	0.0900	1.0800	
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100	
E18 Party wall between dwellings	3.0000	0.0600	0.1800	
E25 Staggered party wall between dwellings	3.0000	0.0600	0.1800	

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

Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	50.7315	(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	43.5224	43.3509	43.1827	42.3930	42.2453	41.5574	41.5574	41.4300	41.8224	42.2453	42.5442	42.8567	(38)
Heat transfer coeff	94.2539	94.0824	93.9143	93.1245	92.9768	92.2889	92.2889	92.1616	92.5539	92.9768	93.2757	93.5882	(39)
Average = Sum(39)m / 12 =												93.1238	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1931	1.1909	1.1888	1.1788	1.1769	1.1682	1.1682	1.1666	1.1716	1.1769	1.1807	1.1847	(40)
HLP (average)												1.1788	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4436 (42)
Hot water usage for mixer showers	65.1911	64.2114	62.7838	60.0523	58.0365	55.7886	54.5108	55.9276	57.4807	59.8943	62.6845	64.9413	(42a)
Hot water usage for baths	28.1575	27.7393	27.1505	26.0647	25.2516	24.3501	23.8631	24.4479	25.0846	26.0493	27.1574	28.0623	(42b)
Hot water usage for other uses	39.6550	38.2130	36.7710	35.3290	33.8870	32.4450	32.4450	33.8870	35.3290	36.7710	38.2130	39.6550	(42c)
Average daily hot water use (litres/day)													122.2605 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.0036	130.1637	126.7052	121.4460	117.1752	112.5837	110.8190	114.2626	117.8944	122.7147	128.0550	132.6587	(44)
Energy conte	210.6452	185.3514	194.7412	166.2535	157.7403	138.4348	134.0260	141.4810	145.3756	166.5226	182.4378	207.7114	(45)
Energy content (annual)										Total = Sum(45)m =		2030.7208	
Distribution loss (46)m = 0.15 x (45)m	31.5968	27.8027	29.2112	24.9380	23.6611	20.7652	20.1039	21.2221	21.8063	24.9784	27.3657	31.1567	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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	257.2401	227.4372	241.3361	211.3453	204.3352	183.5267	180.6209	188.0759	190.4674	213.1175	227.5296	254.3063	(62)
WWHRS	-29.8026	-26.3577	-27.6003	-22.8541	-21.2992	-18.2259	-17.0839	-18.1670	-18.8572	-22.2306	-25.1845	-29.2507	(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	227.4375	201.0795	213.7359	188.4912	183.0360	165.3008	163.5371	169.9089	171.6102	190.8870	202.3451	225.0556	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2302.4246	(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)
													0.0000 (64a)
Heat gains from water heating, kWh/month	107.3155	95.2979	102.0274	91.3528	89.7246	82.1031	81.8396	84.3183	84.4108	92.6447	96.7340	106.3400	(65)

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	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	122.1807	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.6220	121.3672	109.6220	113.2761	109.6220	113.2761	109.6220	109.6220	113.2761	109.6220	113.2761	109.6220	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.3379	219.5931	213.9099	201.8109	186.5382	172.1839	162.5944	160.3391	166.0223	178.1213	193.3941	207.7483	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	35.2181	(69)
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)

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Losses e.g. evaporation (negative values) (Table 5)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	144.2412	141.8124	137.1336	126.8788	120.5976	114.0320	109.9994	113.3311	117.2373	124.5224	134.3528	142.9301 (72)
Total internal gains	533.8552	545.4269	523.3197	504.6200	479.4119	459.1462	441.8700	442.9464	456.1899	474.9199	503.6771	522.9546 (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
Northeast				8.9200	11.2829		0.6300	0.7000	0.7700			30.7581 (75)
East				10.8300	19.6403		0.6300	0.7000	0.7700			65.0051 (76)
Solar gains	95.7632	189.7727	322.2221	490.6799	623.3284	648.6527	613.1472	511.3430	381.0152	227.4037	119.7554	78.5756 (83)
Total gains	629.6184	735.1997	845.5417	995.2999	1102.7403	1107.7989	1055.0172	954.2894	837.2051	702.3236	623.4325	601.5302 (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	54.6818	54.7815	54.8796	55.3450	55.4329	55.8461	55.8461	55.9232	55.6862	55.4329	55.2553	55.0708
alpha	4.6455	4.6521	4.6586	4.6897	4.6955	4.7231	4.7231	4.7282	4.7124	4.6955	4.6837	4.6714
util living area	0.9914	0.9819	0.9559	0.8712	0.7120	0.5201	0.3823	0.4389	0.6986	0.9272	0.9829	0.9930 (86)
MIT	19.6575	19.8788	20.2169	20.6320	20.8873	20.9794	20.9961	20.9927	20.9237	20.5523	20.0313	19.6197 (87)
Th 2	19.9255	19.9273	19.9290	19.9370	19.9385	19.9455	19.9455	19.9468	19.9428	19.9385	19.9355	19.9323 (88)
util rest of house	0.9889	0.9765	0.9429	0.8372	0.6508	0.4399	0.2920	0.3411	0.6142	0.8993	0.9769	0.9909 (89)
MIT 2	18.3835	18.6646	19.0868	19.5832	19.8506	19.9345	19.9443	19.9443	19.8944	19.5080	18.8661	18.3404 (90)
Living area fraction									fLA = Living area / (4) =			0.3089 (91)
MIT	18.7770	19.0396	19.4359	19.9071	20.1708	20.2572	20.2692	20.2681	20.2123	19.8305	19.2259	18.7355 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7770	19.0396	19.4359	19.9071	20.1708	20.2572	20.2692	20.2681	20.2123	19.8305	19.2259	18.7355 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9850	0.9706	0.9355	0.8362	0.6649	0.4641	0.3199	0.3713	0.6370	0.8959	0.9715	0.9875 (94)
Useful gains	620.1677	713.6014	791.0188	832.2207	733.2543	514.0839	337.5484	354.3626	533.3393	629.2123	605.6431	594.0398 (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	1364.5146	1330.2904	1214.8643	1025.0339	787.5859	522.0968	338.6230	356.4934	565.7167	858.2252	1131.0556	1360.3513 (97)
Space heating kWh	553.7941	414.4150	315.3410	138.8255	40.4227	0.0000	0.0000	0.0000	0.0000	170.3856	378.2971	570.1357 (98a)
Space heating requirement - total per year (kWh/year)												2581.6167
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	553.7941	414.4150	315.3410	138.8255	40.4227	0.0000	0.0000	0.0000	0.0000	170.3856	378.2971	570.1357 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2581.6167
Space heating per m ²										(98c) / (4) =		32.6787 (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 %)												92.3000 (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
	553.7941	414.4150	315.3410	138.8255	40.4227	0.0000	0.0000	0.0000	0.0000	170.3856	378.2971	570.1357 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	599.9936	448.9870	341.6479	150.4069	43.7949	0.0000	0.0000	0.0000	0.0000	184.5998	409.8560	617.6985 (211)
Space heating efficiency (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 (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 (213)
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 (215)
Water heating												
Water heating requirement	227.4375	201.0795	213.7359	188.4912	183.0360	165.3008	163.5371	169.9089	171.6102	190.8870	202.3451	225.0556 (64)
Efficiency of water heater (217)m	85.9770	85.6444	84.9304	83.3844	81.2904	79.8000	79.8000	79.8000	79.8000	83.8059	85.4419	79.8000 (216)
Fuel for water heating, kWh/month	264.5328	234.7841	251.6599	226.0510	225.1632	207.1438	204.9337	212.9184	215.0504	227.7727	236.8219	261.5307 (219)
Space cooling fuel requirement												
(221)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 (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	22.7773	18.2728	16.4526	12.0539	9.3108	7.0670	8.4936	11.0403	14.3403	18.8152	21.2517	23.4103 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-14.9015	-22.5214	-34.6742	-41.8467	-47.6769	-45.4402	-44.8828	-41.0881	-34.8767	-26.9665	-16.9091	-12.7127 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)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 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(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)

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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	-4.3771	-9.4873	-19.3933	-29.9383	-40.3995	-40.8980	-40.4225	-33.8537	-24.3284	-13.8327	-5.9266	-3.4413	(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												2796.9846	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2768.3626	(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)												183.8257	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-650.7955	(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												5184.3774	(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	2796.9846	0.2100	587.3668 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2768.3626	0.2100	581.3561 (264)
Space and water heating			1168.7229 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	183.8257	0.1443	26.5317 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-384.4968	0.1332	-51.1995
PV Unit electricity exported	-266.2987	0.1251	-33.3134
Total			-84.5129 (269)
Total CO2, kg/year			1122.6710 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.2100 (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	2796.9846	1.1300	3160.5925 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2768.3626	1.1300	3128.2497 (278)
Space and water heating			6288.8422 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	183.8257	1.5338	281.9580 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-384.4968	1.4921	-573.6900
PV Unit electricity exported	-266.2987	0.4592	-122.2728
Total			-695.9628 (283)
Total Primary energy kWh/year			6004.9383 (286)
Target Primary Energy Rate (TPER)			76.0100 (287)