

Full SAP Calculation Printout



Plot Reference	UNIT 09			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 09		
Plot Address	UNIT 09, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	82 B	DER	3.68	TER	13.85
Environmental	97 A	% DER < TER			73.43
CO ₂ Emissions (t/year)	0.19	DFEE	27.60	TFEE	27.34
Compliance Check	See BREL	% DFEE < TFEE			-0.94
% DPER < TPER	46.75	DPER	39.65	TPER	74.45
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	55.0000 (1b)	2.5000 (2b)	137.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	137.5000 (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)

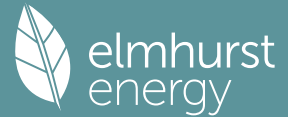
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.1339	0.1313	0.1286	0.1155	0.1129	0.0997	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			3.4300	1.0000	3.4300		(26)
l			24.3100	0.7940	19.3011		(27)
exposed wall	37.2500	27.7400	9.5100	0.1500	1.4265	60.0000	570.6000 (29a)
Total net area of external elements Aum(A, m ²)			37.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.1576		(33)
Main dwelling							
pw			46.5000	0.0000	0.0000	110.0000	5115.0000 (32)
pf			55.0000			40.0000	2200.0000 (32d)
pc			55.0000			30.0000	1650.0000 (32b)
iw			121.0000			9.0000	1089.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	10624.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		193.1745 (35)
List of Thermal Bridges		
K1 Element	Length	Psi-value
		Total

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E2 Other lintels (including other steel lintels)	11.0900	0.0500	0.5545	
E3 Sill	9.7200	0.0500	0.4860	
E4 Jamb	40.0000	0.0500	2.0000	
E7 Party floor between dwellings (in blocks of flats)	3.5000	0.0700	0.2450	
E24 Eaves (insulation at ceiling level - inverted)	9.0000	0.0800	0.7200	
E16 Corner (normal)	10.0000	0.0900	0.9000	
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750	
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.3805 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		28.5381 (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
Heat transfer coeff	10.3852	10.2661	10.1470	9.5514	9.4323	8.8368	8.8368	8.7177	9.0750	9.4323	9.6705	9.9088 (38)
Average = Sum(39)m / 12 =	38.9233	38.8042	38.6851	38.0896	37.9705	37.3749	37.3749	37.2558	37.6131	37.9705	38.2087	38.4469 (39)
												38.0598
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7077	0.7055	0.7034	0.6925	0.6904	0.6795	0.6795	0.6774	0.6839	0.6904	0.6947	0.6990 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.8374 (42)
Hot water usage for mixer showers												
	55.0260	54.1991	52.9941	50.6885	48.9871	47.0896	46.0111	47.2070	48.5179	50.5552	52.9103	54.8152 (42a)
Hot water usage for baths	23.7862	23.4330	22.9355	22.0183	21.3314	20.5699	20.1585	20.6525	21.1904	22.0053	22.9414	23.7058 (42b)
Hot water usage for other uses	33.4464	32.2302	31.0139	29.7977	28.5815	27.3652	27.3652	28.5815	29.7977	31.0139	32.2302	33.4464 (42c)
Average daily hot water use (litres/day)												103.1915 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	112.2586	109.8622	106.9435	102.5045	98.9000	95.0247	93.5349	96.4410	99.5060	103.5744	108.0818	111.9674 (44)
Energy conte	177.7902	156.4423	164.3682	140.3235	133.1384	116.8440	113.1223	119.4141	122.7008	140.5495	153.9824	175.3139 (45)
Energy content (annual)										Total = Sum(45)m =		1713.9895
Distribution loss (46)m = 0.15 x (45)m	26.6685	23.4663	24.6552	21.0485	19.9708	17.5266	16.9684	17.9121	18.4051	21.0824	23.0974	26.2971 (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	233.0670	206.3697	219.6450	193.8172	188.4152	170.3377	168.3991	174.6909	176.1945	195.8263	207.4761	230.5907 (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)
FV 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	233.0670	206.3697	219.6450	193.8172	188.4152	170.3377	168.3991	174.6909	176.1945	195.8263	207.4761	230.5907 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2364.8293 (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	103.3367	91.9590	98.8739	89.4525	88.4900	81.6456	81.8346	83.9266	83.5930	90.9541	93.9941	102.5133 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	80.7953	89.4519	80.7953	83.4884	80.7953	83.4884	80.7953	80.7953	83.4884	80.7953	83.4884	80.7953 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	160.1856	161.8479	157.6591	148.7417	137.4852	126.9056	119.8378	118.1755	122.3643	131.2817	142.5382	153.1178 (68)
Pumps, fans	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944 (71)
Total internal gains	138.8934	136.8438	132.8950	124.2396	118.9381	113.3966	109.9928	112.8046	116.1013	122.2502	130.5473	137.7867 (72)
	430.4347	438.7039	421.9097	407.0302	387.7789	374.3510	361.1862	362.3358	372.5145	384.8875	407.1344	422.2602 (73)

6. Solar gains												
[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
North		2.0000	10.6334	0.5300	0.7000	0.7700	5.4678 (74)					
Northeast		18.2300	11.2829	0.5300	0.7000	0.7700	52.8830 (75)					
East		4.0800	19.6403	0.5300	0.7000	0.7700	20.6022 (76)					

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Solar gains	78.9530	158.3964	278.0698	443.8284	585.1888	619.0099	581.0061	470.1794	334.8629	191.8111	98.9743	64.6874 (83)
Total gains	509.3877	597.1003	699.9795	850.8585	972.9677	993.3609	942.1923	832.5152	707.3774	576.6986	506.1087	486.9476 (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	75.8229	76.0556	76.2898	77.4826	77.7256	78.9642	78.9642	79.2166	78.4640	77.7256	77.2410	76.7625
alpha	6.0549	6.0704	6.0860	6.1655	6.1817	6.2643	6.2643	6.2811	6.2309	6.1817	6.1494	6.1175
util living area	0.9398	0.8772	0.7491	0.5359	0.3625	0.2408	0.1745	0.2058	0.3664	0.6625	0.8800	0.9495 (86)
MIT	20.5486	20.7339	20.9036	20.9871	20.9989	20.9999	21.0000	21.0000	20.9992	20.9661	20.7734	20.5154 (87)
Th 2	20.3340	20.3359	20.3379	20.3474	20.3493	20.3589	20.3589	20.3609	20.3551	20.3493	20.3455	20.3417 (88)
util rest of house	0.9294	0.8599	0.7234	0.5084	0.3373	0.2167	0.1491	0.1772	0.3324	0.6264	0.8601	0.9406 (89)
MIT 2	19.8247	20.0466	20.2399	20.3356	20.3484	20.3589	20.3589	20.3609	20.3545	20.3190	20.1054	19.7908 (90)
Living area fraction									fLA = Living area / (4) =			0.2964 (91)
MIT	20.0392	20.2503	20.4366	20.5287	20.5412	20.5489	20.5489	20.5503	20.5456	20.5108	20.3034	20.0056 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0392	20.2503	20.4366	20.5287	20.5412	20.5489	20.5489	20.5503	20.5456	20.5108	20.3034	20.0056 (93)

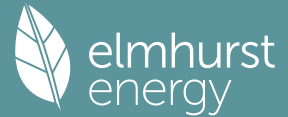
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9243	0.8575	0.7273	0.5161	0.3447	0.2238	0.1566	0.1857	0.3424	0.6355	0.8587	0.9354 (94)
Useful gains	470.8138	512.0276	509.1295	439.1033	335.3988	222.3242	147.5894	154.6182	242.2366	366.5193	434.6167	455.4881 (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	612.6231	595.6569	539.1380	442.9322	335.7047	222.3388	147.5906	154.6215	242.4384	376.3174	504.4842	607.6751 (97)
Space heating kWh	105.5062	56.1989	22.3264	2.7568	0.2276	0.0000	0.0000	0.0000	0.0000	7.2897	50.3046	113.2271 (98a)
Space heating requirement - total per year (kWh/year)												357.8373
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	105.5062	56.1989	22.3264	2.7568	0.2276	0.0000	0.0000	0.0000	0.0000	7.2897	50.3046	113.2271 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												357.8373
Space heating per m2										(98c) / (4) =		6.5061 (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												
	105.5062	56.1989	22.3264	2.7568	0.2276	0.0000	0.0000	0.0000	0.0000	7.2897	50.3046	113.2271 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	158.2592	84.2983	33.4896	4.1352	0.3414	0.0000	0.0000	0.0000	0.0000	10.9346	75.4570	169.8407
Space heating requirement												
	158.2592	84.2983	33.4896	4.1352	0.3414	0.0000	0.0000	0.0000	0.0000	10.9346	75.4570	169.8407 (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												
	233.0670	206.3697	219.6450	193.8172	188.4152	170.3377	168.3991	174.6909	176.1945	195.8263	207.4761	230.5907 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	349.6005	309.5546	329.4675	290.7258	282.6228	255.5065	252.5987	262.0363	264.2918	293.7394	311.2141	345.8860
Water heating fuel												
	349.6005	309.5546	329.4675	290.7258	282.6228	255.5065	252.5987	262.0363	264.2918	293.7394	311.2141	345.8860 (310)
Cooling System Energy Efficiency Ratio												0.0000 (314)
Space coolin												0.0000 (315)
Pumps and Fa												9.8734 (311)
Lighting												17.2542 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.3642	-4.2256	-7.8584	-11.1585	-14.0470	-13.8914	-13.5955	-11.6479	-8.6932	-5.5345	-2.8467	-1.9275 (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	-0.2666	-0.7095	-1.8553	-3.5295	-5.3803	-5.6926	-5.5283	-4.2380	-2.5676	-1.1437	-0.3847	-0.1973 (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												536.7560 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3547.2439 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												5.3676 (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)												116.2508 (330a)
Total electricity for the above, kWh/year												116.2508 (331)
Electricity for lighting (calculated in Appendix L)												135.4860 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-129.2838 (333)
Wind generation												0.0000 (334)

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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	4206.4529 (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	1237.5757	0.1595	25.9422 (367)
Electrical energy for heat distribution (space & water)	5.3676	0.0000	5.8502 (372)
Overall CO2 factor for heat network			0.0448 (386)
Total CO2 associated with community systems			183.1302 (373)
Space and water heating			183.1302 (376)
Pumps, fans and electric keep-hot	116.2508	0.1387	16.1254 (378)
Energy for lighting	135.4860	0.1443	19.5548 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-97.7905	0.1304	-12.7516
PV Unit electricity exported	-31.4933	0.1205	-3.7961
Total			-16.5477 (380)
Total CO2, kg/year			202.2627 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.6800 (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	1237.5757	1.5903	258.6657 (467)
Electrical energy for heat distribution (space & water)	5.3676	0.0000	62.4747 (472)
Overall CO2 factor for heat network			0.4789 (486)
Total CO2 associated with community systems			1955.6489 (473)
Space and water heating			1955.6489 (476)
Pumps, fans and electric keep-hot	116.2508	1.5128	175.8641 (478)
Energy for lighting	135.4860	1.5338	207.8130 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-97.7905	1.4817	-144.8941
PV Unit electricity exported	-31.4933	0.4422	-13.9254
Total			-158.8196 (480)
Total Primary energy kWh/year			2180.5064 (483)
Dwelling Primary energy Rate (DPER)			39.6500 (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	55.0000 (1b)	x 2.5000 (2b)	= 137.5000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 137.5000 (5)
Dwelling volume			

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) = 0.1455 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3955 (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) = 0.2768 (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	0.3529	0.3460	0.3391	0.3045	0.2976	0.2630	0.2630	0.2561	0.2768	0.2976	0.3114	0.3253 (22b)
Effective ac	0.5623	0.5599	0.5575	0.5464	0.5443	0.5346	0.5346	0.5328	0.5383	0.5443	0.5485	0.5529 (25)

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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			3.4300	1.0000	3.4300			(26)
TER Opening Type			10.3300	1.1450	11.8282			(27)
exposed wall	37.2500	13.7600	23.4900	0.1800	4.2282			(29a)
Total net area of external elements Aum(A, m2)			37.2500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.4864		(33)
Main dwelling								
pw			46.5000	0.0000	0.0000			(32)

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

193.1745 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	11.0900	0.0500	0.5545
E3 Sill	9.7200	0.0500	0.4860
E4 Jamb	40.0000	0.0500	2.0000
E7 Party floor between dwellings (in blocks of flats)	3.5000	0.0700	0.2450
E24 Eaves (insulation at ceiling level - inverted)	9.0000	0.2400	2.1600
E16 Corner (normal)	10.0000	0.0900	0.9000
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500

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

Point Thermal bridges	(36a) =	5.8205 (36)
Total fabric heat loss	(33) + (36) + (36a) =	25.3069 (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	
Heat transfer coeff	25.5137	25.4039	25.2963	24.7911	24.6966	24.2565	24.2565	24.1750	24.4260	24.6966	24.8878	25.0877	(38)
Average = Sum(39)m / 12 =	50.8206	50.7109	50.6033	50.0980	50.0035	49.5634	49.5634	49.4820	49.7329	50.0035	50.1947	50.3947	(39)
												50.0976	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9240	0.9220	0.9201	0.9109	0.9092	0.9012	0.9012	0.8997	0.9042	0.9092	0.9126	0.9163	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

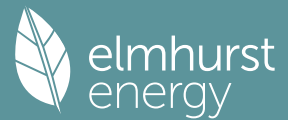
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8374 (42)
Hot water usage for mixer showers													
55.0260	54.1991	52.9941	50.6885	48.9871	47.0896	46.0111	47.2070	48.5179	50.5552	52.9103	54.8152	(42a)	
Hot water usage for baths													
23.7862	23.4330	22.9355	22.0183	21.3314	20.5699	20.1585	20.6525	21.1904	22.0053	22.9414	23.7058	(42b)	
Hot water usage for other uses													
33.4464	32.2302	31.0139	29.7977	28.5815	27.3652	27.3652	28.5815	29.7977	31.0139	32.2302	33.4464	(42c)	
Average daily hot water use (litres/day)													103.1915 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
112.2586	109.8622	106.9435	102.5045	98.9000	95.0247	93.5349	96.4410	99.5060	103.5744	108.0818	111.9674	(44)	
Energy content (annual)	177.7902	156.4423	164.3682	140.3235	133.1384	116.8440	113.1223	119.4141	122.7008	140.5495	153.9824	175.3139	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1713.9895	
26.6685	23.4663	24.6552	21.0485	19.9708	17.5266	16.9684	17.9121	18.4051	21.0824	23.0974	26.2971	(46)	
Water storage loss (or HIU loss):													
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	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	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	50.3983	46.8615	47.6644	49.1453	49.0714	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
228.7491	202.4697	215.3271	189.6386	183.5367	163.7055	160.7867	168.5594	171.7723	191.5084	203.2974	226.2728	(62)	
WWHRS	-25.1556	-22.2478	-23.2966	-19.2905	-17.9781	-15.3840	-14.4200	-15.3342	-15.9168	-18.7642	-21.2576	-24.6897	(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													
203.5935	180.2219	192.0304	170.3480	165.5587	148.3216	146.3667	153.2251	155.8554	172.7442	182.0399	201.5830	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2071.8884 (64)
Electric shower(s)													2072 (64)
0.0000	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)
Heat gains from water heating, kWh/month													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
71.8550	63.5239	67.3921	58.9863	56.8681	50.5660	49.5293	51.9915	53.0659	59.4724	63.5279	71.0316	(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	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680	91.8680 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.9955	90.7807	81.9955	84.7287	81.9955	84.7287	81.9955	81.9955	84.7287	81.9955	84.7287	81.9955 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.1856	161.8479	157.6591	148.7417	137.4852	126.9056	119.8378	118.1755	122.3643	131.2817	142.5382	153.1178 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868	32.1868 (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)
Losses e.g. evaporation (negative values) (Table 5)	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944	-73.4944 (71)
Water heating gains (Table 5)	96.5793	94.5296	90.5808	81.9255	76.4356	70.2306	66.5716	69.8810	73.7026	79.9361	88.2332	95.4726 (72)
Total internal gains	392.3208	400.7186	383.7958	368.9563	349.4767	332.4252	318.9652	320.6125	331.3560	346.7736	369.0605	384.1462 (73)

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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
North	0.8500		10.6334	0.6300	0.7000	0.7700	2.7622 (74)
Northeast	7.7500		11.2829	0.6300	0.7000	0.7700	26.7237 (75)
East	1.7300		19.6403	0.6300	0.7000	0.7700	10.3840 (76)
Solar gains	39.8699	79.9889	140.4288	295.5553	312.6422	96.8644	32.6659 (83)
Total gains	432.1907	480.7075	524.2246	645.0320	645.0675	443.6380	416.8122 (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	58.0725	58.1981	58.3219	58.9101	59.0214	59.5455	59.5455	59.6435	59.3425	59.0214	58.7966	58.5633
alpha	4.8715	4.8799	4.8881	4.9273	4.9348	4.9697	4.9697	4.9762	4.9562	4.9348	4.9198	4.9042
util living area	0.9813	0.9676	0.9360	0.8402	0.6742	0.4843	0.3547	0.4051	0.6485	0.8901	0.9658	0.9840 (86)
MIT	19.9379	20.1207	20.3913	20.7294	20.9243	20.9879	20.9979	20.9961	20.9533	20.6859	20.2651	19.9062 (87)
Th 2	20.1471	20.1488	20.1505	20.1583	20.1597	20.1665	20.1665	20.1678	20.1639	20.1597	20.1568	20.1537 (88)
util rest of house	0.9771	0.9604	0.9220	0.8097	0.6252	0.4241	0.2882	0.3331	0.5821	0.8610	0.9570	0.9804 (89)
MIT 2	18.9175	19.1481	19.4841	19.8886	20.0960	20.1590	20.1657	20.1661	20.1309	19.8503	19.3382	18.8824 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2199	19.4364	19.7530	20.1378	20.3415	20.4047	20.4123	20.4120	20.3746	20.0979	19.6129	19.1858 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2199	19.4364	19.7530	20.1378	20.3415	20.4047	20.4123	20.4120	20.3746	20.0979	19.6129	19.1858 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9711	0.9530	0.9144	0.8089	0.6361	0.4415	0.3079	0.3544	0.5995	0.8585	0.9500	0.9750 (94)
Useful gains	419.7116	458.1180	479.3745	479.7740	410.3332	284.7928	188.5728	197.7757	300.0300	380.8730	398.0871	406.3748 (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	758.2382	737.1513	670.6453	562.9895	432.1061	287.6986	188.9517	198.5240	312.0554	474.9294	628.0804	755.2046 (97)
Space heating kWh	251.8638	187.5103	142.3055	59.9152	16.1990	0.0000	0.0000	0.0000	0.0000	69.9780	165.5951	259.5294 (98a)
Space heating requirement - total per year (kWh/year)	1152.8964											
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	251.8638	187.5103	142.3055	59.9152	16.1990	0.0000	0.0000	0.0000	0.0000	69.9780	165.5951	259.5294 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1152.8964											
Space heating per m2	(98c) / (4) =											

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)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	251.8638	187.5103	142.3055	59.9152	16.1990	0.0000	0.0000	0.0000	0.0000	69.9780	165.5951	259.5294 (98)
Space heating efficiency (main heating system 1)	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 fuel (main heating system)	272.5799	202.9333	154.0103	64.8433	17.5314	0.0000	0.0000	0.0000	0.0000	75.7338	179.2155	280.8759 (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	203.5935	180.2219	192.0304	170.3480	165.5587	148.3216	146.3667	153.2251	155.8554	172.7442	182.0399	201.5830 (64)
Efficiency of water heater (217)m	84.8384	84.4665	83.7484	82.3735	80.9983	80.3000	80.3000	80.3000	80.3000	82.6038	84.1790	80.3000 (216)
Fuel for water heating, kWh/month	239.9779	213.3648	229.2946	206.7997	204.3976	184.7093	182.2748	190.8158	194.0914	209.1237	216.2532	84.9239 (217)
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	17.0370	13.6677	12.3063	9.0161	6.9643	5.6899	6.3531	8.2580	10.7263	14.0735	15.8959	17.5106 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-10.4843	-15.9063	-24.5860	-29.8000	-34.0780	-32.5400	-32.1560	-29.3846	-24.8548	-19.1126	-11.9222	-8.9387 (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)
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	-2.9375	-6.3783	-13.0559	-20.1769	-27.2410	-27.5689	-27.2338	-22.7900	-16.3639	-9.2919	-3.9761	-2.3077 (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)												

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(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												1247.7233	(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												2508.4719	(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)												137.4987	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-453.0855	(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												3526.6084	(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	1247.7233	0.2100	262.0219	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2508.4719	0.2100	526.7791	(264)
Space and water heating			788.8010	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	137.4987	0.1443	19.8453	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-273.7636	0.1331	-36.4294	
PV Unit electricity exported	-179.3219	0.1251	-22.4297	
Total			-58.8591	(269)
Total CO2, kg/year			761.7165	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.8500	(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	1247.7233	1.1300	1409.9274	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2508.4719	1.1300	2834.5732	(278)
Space and water heating			4244.5006	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	137.4987	1.5338	210.9001	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-273.7636	1.4917	-408.3765	
PV Unit electricity exported	-179.3219	0.4591	-82.3256	
Total			-490.7021	(283)
Total Primary energy kWh/year			4094.7994	(286)
Target Primary Energy Rate (TPER)			74.4500	(287)