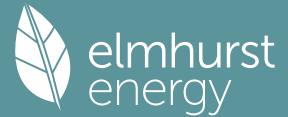


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Plot Reference	Land to the rear of 28 Sidney			Issued on Date	25/09/2026
Assessment Reference	Be Lean	Plot Type Ref			
Plot Address	Land to the rear of , 28 Sidney Road, London, N22 8LS			SAP Version	10.2
SAP Rating	82 B	DER	18.19	TER	15.95
Environmental	87 B	% DER < TER			-14.04
CO ₂ Emissions (t/year)	0.94	DFEE	53.84	TFEE	58.25
Compliance Check	See BREL	% DFEE < TFEE			7.56
% DPER < TPER	-22.40	DPER	102.97	TPER	84.13
Assessor Details	Mr. Liam Rushton			Assessor ID	AK74-0001
Client	Crawford Partnership, Crawford Partnership				

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	38.1500 (1b)	x 2.7000 (2b)	= 103.0050 (1b) - (3b)
First floor	19.1300 (1c)	x 2.4200 (2c)	= 46.2946 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 149.2996 (5)

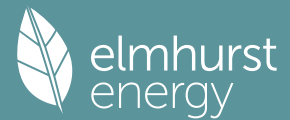
2. Ventilation rate

	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	2 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)											
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (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							
Solid Door			1.6200	1.0000	1.6200		(26)
Glazed Door			4.7900	1.0536	5.0469		(27)
Window			7.4900	1.0536	7.8918		(27)
Rooflight			8.3800	0.8687	7.2799		(27a)
Ground Floor			38.1400	0.1000	3.8140	110.0000	4195.4000 (28a)
External Wall GF	67.7800	7.2100	60.5700	0.1600	9.6912	9.0000	545.1300 (29a)
External Wall Clad FF	46.3000	6.6900	39.6100	0.1600	6.3376	9.0000	356.4900 (29a)
Ground Floor Flat Roof	19.0200	5.2400	13.7800	0.1100	1.5158	9.0000	124.0200 (30)
First Floor Flat Roof	15.5600	3.1400	12.4200	0.1100	1.3662	9.0000	111.7800 (30)
First Floor Sloped Roof	5.7800		5.7800	0.1100	0.6358	9.0000	52.0200 (30)
Total net area of external elements Aum(A, m ²)			192.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.1992		(33)
Main dwelling							
Internal Wall			91.0000			9.0000	819.0000 (32c)

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FF Internal Floor	19.1300										18.0000	344.3400	(32d)	
Internal Ceiling GF	19.1300										9.0000	172.1700	(32e)	
Heat capacity Cm = Sum(A x k)											(28)...(30) + (32) + (32a)...(32e) =	6720.3500	(34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												117.3245	(35)	
List of Thermal Bridges														
K1 Element											Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)											9.0800	0.1000	0.9080	
E3 Sill											8.1800	0.0500	0.4090	
E4 Jamb											30.8000	0.0500	1.5400	
E5 Ground floor (normal)											27.1100	0.1600	4.3376	
E6 Intermediate floor within a dwelling											8.5700	0.0200	0.1714	
E16 Corner (normal)											28.3000	0.0900	2.5470	
R11 Upstands or kerbs of rooflights											33.5600	0.0800	2.6848	
E24 Eaves (insulation at ceiling level - inverted)											10.2400	0.1500	1.5360	
E14 Flat roof											20.0800	0.0800	1.6064	
E17 Corner (inverted - internal area greater than external area)											7.8200	-0.0900	-0.7038	
E14 Flat roof											13.3300	0.0800	1.0664	
E13 Gable (insulation at rafter level)											3.3600	0.0800	0.2688	
E11 Eaves (insulation at rafter level)											3.4400	0.0400	0.1376	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													16.5092	(36)
Point Thermal bridges												(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =		61.7084	(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	(38)	
Heat transfer coeff	12.9115	12.7545	12.5974	11.8122	11.6552	10.8699	10.8699	10.7129	11.1840	11.6552	11.9693	12.2833	(38)	
Average = Sum(39)m / 12 =	74.6199	74.4629	74.3059	73.5206	73.3636	72.5784	72.5784	72.4213	72.8925	73.3636	73.6777	73.9918	(39)	
												73.4814		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)	
HLP (average)	1.3027	1.3000	1.2972	1.2835	1.2808	1.2671	1.2671	1.2643	1.2726	1.2808	1.2863	1.2918	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

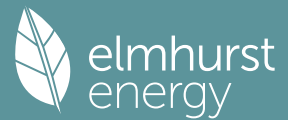
4. Water heating energy requirements (kWh/year)														

Assumed occupancy													1.9038	(42)
Hot water usage for mixer showers	76.5723	75.4215	73.7447	70.5364	68.1687	65.5283	64.0275	65.6916	67.5158	70.3508	73.6281	76.2789	(42a)	
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses	34.1266	32.8856	31.6447	30.4037	29.1627	27.9218	27.9218	29.1627	30.4037	31.6447	32.8856	34.1266	(42c)	
Average daily hot water use (litres/day)													101.6213	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	110.6989	108.3072	105.3894	100.9401	97.3314	93.4501	91.9493	94.8544	97.9196	101.9955	106.5137	110.4055	(44)	
Energy content (annual)	175.3200	154.2280	161.9795	138.1819	131.0268	114.9078	111.2047	117.4495	120.7446	138.4070	151.7484	172.8683	(45)	
Distribution loss (46)m = 0.15 x (45)m	26.2980	23.1342	24.2969	20.7273	19.6540	17.2362	16.6807	17.6174	18.1117	20.7610	22.7623	25.9303	(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	(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	49.5990	46.0850	46.8563	48.3367	48.2891	50.9589	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month	226.2789	200.2554	212.9385	187.4970	180.6259	160.9927	158.0610	165.7863	169.0337	189.3659	201.0634	223.8273	(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	226.2789	200.2554	212.9385	187.4970	180.6259	160.9927	158.0610	165.7863	169.0337	189.3659	201.0634	223.8273	(64)	
12Total per year (kWh/year)											Total per year (kWh/year) = Sum(64)m =	2275.7258	(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	71.0336	62.7877	66.5979	58.2743	55.9662	49.7281	48.6896	51.1362	52.2199	58.7600	62.7851	70.2185	(65)	

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

6. Solar gains

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East	2.6400	19.6403	0.4500	0.7000	0.7700	11.3187 (76)
West	2.1500	19.6403	0.4500	0.7000	0.7700	9.2178 (80)
North	2.0400	10.6334	0.4500	0.7000	0.7700	4.7353 (74)
South	0.8500	46.7521	0.4500	0.7000	0.7700	8.6749 (78)
West	4.6000	19.6403	0.4500	0.7000	0.7700	19.7219 (80)
Horizontal	8.3800	26.0000	0.4000	0.7000	1.0000	54.9058 (82)

Solar gains	108.5743	216.0456	365.9001	551.0724	691.8612	715.7887	678.3437	571.4589	431.0881	258.9203	136.0099	88.8970 (83)
Total gains	508.3926	624.5185	757.1376	927.2814	1047.8976	1054.4939	1003.3076	897.9881	768.5469	612.2817	512.0537	480.2935 (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	25.0170	25.0697	25.1227	25.3910	25.4454	25.7207	25.7207	25.7764	25.6098	25.4454	25.3369	25.2293
alpha	2.6678	2.6713	2.6748	2.6927	2.6964	2.7147	2.7147	2.7184	2.7073	2.6964	2.6891	2.6820
util living area	0.9438	0.9077	0.8407	0.7139	0.5613	0.4126	0.3085	0.3548	0.5639	0.8040	0.9160	0.9506 (86)
MIT	18.6422	19.0540	19.6413	20.2957	20.7085	20.9084	20.9693	20.9548	20.7839	20.1615	19.2837	18.5723 (87)
Th 2	19.8387	19.8408	19.8430	19.8538	19.8559	19.8667	19.8667	19.8689	19.8624	19.8559	19.8516	19.8473 (88)
util rest of house	0.9346	0.8934	0.8173	0.6760	0.5091	0.3474	0.2327	0.2734	0.4925	0.7660	0.9004	0.9425 (89)
MIT 2	17.1369	17.6495	18.3692	19.1450	19.5983	19.8034	19.8523	19.8460	19.6969	19.0213	17.9534	17.0544 (90)
Living area fraction	17.8669	18.3307	18.9862	19.7030	20.1367	20.3393	20.3940	20.3838	20.2241	19.5743	18.5986	17.7906 (91)
MIT	17.8669	18.3307	18.9862	19.7030	20.1367	20.3393	20.3940	20.3838	20.2241	19.5743	18.5986	17.7906 (92)
Temperature adjustment	17.7169	18.1807	18.8362	19.5530	19.9867	20.1893	20.2440	20.2338	20.0741	19.4243	18.4486	-0.1500
adjusted MIT	17.7169	18.1807	18.8362	19.5530	19.9867	20.1893	20.2440	20.2338	20.0741	19.4243	18.4486	17.6406 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9119	0.8676	0.7932	0.6651	0.5154	0.3665	0.2584	0.3003	0.5065	0.7495	0.8760	0.9212 (94)
Useful gains	463.6265	541.8068	600.5866	616.7581	540.0730	386.4454	259.2203	269.6565	389.3073	458.8807	448.5629	442.4374 (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	1001.1706	988.9166	916.6515	783.2188	607.9456	405.6606	264.4759	277.6479	435.4667	647.3808	836.1372	994.4912 (97)
Space heating kWh	399.9328	300.4578	235.1523	119.8517	50.4972	0.0000	0.0000	0.0000	0.0000	140.2440	279.0535	410.7281 (98a)
Space heating requirement - total per year (kWh/year)												1935.9174
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	399.9328	300.4578	235.1523	119.8517	50.4972	0.0000	0.0000	0.0000	0.0000	140.2440	279.0535	410.7281 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1935.9174
Space heating per m2										(98c) / (4) =		33.7974 (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 %)												89.5000 (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	399.9328	300.4578	235.1523	119.8517	50.4972	0.0000	0.0000	0.0000	0.0000	140.2440	279.0535	410.7281 (98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	89.5000	0.0000	89.5000	89.5000	89.5000 (210)
Space heating fuel (main heating system)	446.8522	335.7071	262.7400	133.9125	56.4215	0.0000	0.0000	0.0000	0.0000	156.6972	311.7917	458.9140 (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	226.2789	200.2554	212.9385	187.4970	180.6259	160.9927	158.0610	165.7863	169.0337	189.3659	201.0634	223.8273 (64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000 (216)
Fuel for water heating, kWh/month	252.8256	223.7490	237.9201	209.4938	201.8166	179.8801	176.6045	185.2361	188.8645	211.5820	224.6519	250.0863 (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	20.5154	18.5300	20.5154	19.8536	20.5154	19.8536	20.5154	20.5154	19.8536	20.5154	19.8536	20.5154 (231)
Lighting	17.4011	13.9598	12.5692	9.2088	7.1131	5.8115	6.4888	8.4344	10.9555	14.3742	16.2356	17.8847 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)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 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												2163.0362 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	89.5000	
Water heating fuel used	2542.7104	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)		
mechanical ventilation fans (SFP = 0.8540)	155.5523	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	241.5523	(231)
Electricity for lighting (calculated in Appendix L)	140.4366	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(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	5087.7355	(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	2163.0362	0.2100	454.2376 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2542.7104	0.2100	533.9692 (264)
Space and water heating			988.2068 (265)
Pumps, fans and electric keep-hot	241.5523	0.1387	33.5063 (267)
Energy for lighting	140.4366	0.1443	20.2693 (268)
Total CO2, kg/year			1041.9824 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.1900 (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	2163.0362	1.1300	2444.2309 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2542.7104	1.1300	2873.2627 (278)
Space and water heating			5317.4936 (279)
Pumps, fans and electric keep-hot	241.5523	1.5128	365.4203 (281)
Energy for lighting	140.4366	1.5338	215.4064 (282)
Total Primary energy kWh/year			5898.3203 (286)
Dwelling Primary energy Rate (DPER)			102.9700 (287)

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

1. Overall dwelling characteristics

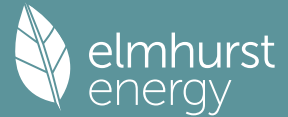
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	38.1500 (1b)	x 2.7000 (2b)	= 103.0050 (1b) - (3b)
First floor	19.1300 (1c)	x 2.4200 (2c)	= 46.2946 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	149.2996 (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) = 0.1340 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3840 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3264 (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 infiltr rate	0.4161	0.4080	0.3998	0.3590	0.3508	0.3100	0.3100	0.3019	0.3264	0.3508	0.3672	0.3835 (22b)
Effective ac	0.5866	0.5832	0.5799	0.5644	0.5615	0.5481	0.5481	0.5456	0.5533	0.5615	0.5674	0.5735 (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			1.6200	1.0000	1.6200		(26)
TER Opening Type			7.5400	1.1450	8.6336		(27)
TER Roof Light			5.1500	1.5918	10.4136		(27a)
Ground Floor			38.1400	0.1300	4.9582		(28a)
External Wall GF	67.7800	5.0500	62.7300	0.1800	11.2914		(29a)
External Wall Clad FF	46.3000	4.1100	42.1900	0.1800	7.5942		(29a)
Ground Floor Flat Roof	19.0200	3.2200	15.8000	0.1100	1.7380		(30)
First Floor Flat Roof	15.5600	1.9300	13.6300	0.1100	1.4993		(30)
First Floor Sloped Roof	5.7800		5.7800	0.1100	0.6358		(30)
Total net area of external elements Aum(A, m2)			192.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	48.3841	(33)

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

117.3245 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.0800	0.0500	0.4540
E3 Sill	8.1800	0.0500	0.4090
E4 Jamb	30.8000	0.0500	1.5400
E5 Ground floor (normal)	27.1100	0.1600	4.3376
E6 Intermediate floor within a dwelling	8.5700	0.0000	0.0000
E16 Corner (normal)	28.3000	0.0900	2.5470
R11 Upstands or kerbs of rooflights	33.5600	0.0800	2.6848
E24 Eaves (insulation at ceiling level - inverted)	10.2400	0.2400	2.4576
E14 Flat roof	20.0800	0.0800	1.6064
E17 Corner (inverted - internal area greater than external area)	7.8200	-0.0900	-0.7038
E14 Flat roof	13.3300	0.0800	1.0664
E13 Gable (insulation at rafter level)	3.3600	0.0800	0.2688
E11 Eaves (insulation at rafter level)	3.4400	0.0400	0.1376

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

16.8054 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 65.1895 (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	28.8999	28.7343	28.5719	27.8094	27.6667	27.0025	27.0025	26.8795	27.2583	27.6667	27.9553	28.2571
Heat transfer coeff	94.0894	93.9238	93.7614	92.9989	92.8562	92.1920	92.1920	92.0690	92.4478	92.8562	93.1448	93.4466
Average = Sum(39)m / 12 =												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6426	1.6397	1.6369	1.6236	1.6211	1.6095	1.6095	1.6074	1.6140	1.6211	1.6261	1.6314
HLP (average)												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

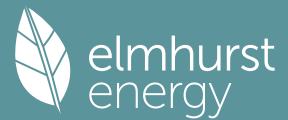
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9038 (42)
Hot water usage for mixer showers	72.0680	70.9850	69.4068	66.3872	64.1588	61.6737	60.2612	61.8274	63.5443	66.2126	69.2970	71.7919
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hot water usage for other uses	34.1266	32.8856	31.6447	30.4037	29.1627	27.9218	27.9218	29.1627	30.4037	31.6447	32.8856	34.1266
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	106.1946	103.8706	101.0515	96.7909	93.3215	89.5955	88.1829	90.9902	93.9480	97.8572	102.1827	105.9185
Energy conte	168.1863	147.9104	155.3123	132.5019	125.6287	110.1681	106.6496	112.6648	115.8473	132.7913	145.5780	165.8428
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	25.2280	22.1866	23.2968	19.8753	18.8443	16.5252	15.9974	16.8997	17.3771	19.9187	21.8367	24.8764
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
If cylinder contains dedicated solar storage												
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
Combi loss	50.9589	46.0274	50.9589	47.7325	47.5556	44.1841	44.9371	46.3676	46.3305	49.8670	49.3151	50.9589
Total heat required for water heating calculated for each month	219.1453	193.9378	206.2712	180.2344	173.1843	154.3521	151.5867	159.0324	162.1779	182.6583	194.8930	216.8017
WWHRS	-32.9465	-29.1381	-30.5118	-25.2650	-23.5460	-20.1485	-18.8860	-20.0834	-20.8464	-24.5756	-27.8412	-32.3364
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
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
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
Output from w/h	186.1988	164.7996	175.7594	154.9694	149.6383	134.2036	132.7007	138.9490	141.3314	158.0827	167.0518	184.4653
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
Heat gains from water heating, kWh/month	68.6617	60.6871	64.3811	55.9900	53.6604	47.6769	46.6953	49.0530	50.1019	56.6199	60.7334	67.8825

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

Metabolic gains (Table 5), Watts												
(66)m	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890	95.1890
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	83.7475	92.7204	83.7475	86.5391	83.7475	86.5391	83.7475	83.7475	86.5391	83.7475	86.5391	83.7475

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.0388	167.7617	163.4199	154.1767	142.5088	131.5427	124.2166	122.4936	126.8354	136.0786	147.7465	158.7127 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189	32.5189 (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)	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512	-76.1512 (71)
Water heating gains (Table 5)	92.2872	90.3081	86.5337	77.7639	72.1243	66.2179	62.7624	65.9314	69.5859	76.1020	84.3520	91.2399 (72)
Total internal gains	396.6302	405.3470	388.2578	373.0364	352.9373	335.8564	322.2832	323.7292	334.5172	350.4848	373.1943	388.2568 (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
North					1.2500	10.6334		0.6300	0.7000	0.7700		4.0621 (74)
East					1.6200	19.6403		0.6300	0.7000	0.7700		9.7238 (76)
South					0.5200	46.7521		0.6300	0.7000	0.7700		7.4298 (78)
West					4.1500	19.6403		0.6300	0.7000	0.7700		24.9096 (80)
Horizontal					5.1500	26.0000		0.6300	0.7000	1.0000		53.1449 (82)
Solar gains	99.2702	198.0591	336.4935	508.0374	638.6787	661.0791	626.3728	527.1664	396.8819	237.6629	124.4549	81.2120 (83)
Total gains	495.9004	603.4061	724.7513	881.0738	991.6160	996.9354	948.6561	850.8956	731.3991	588.1477	497.6492	469.4687 (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	19.8403	19.8753	19.9097	20.0730	20.1038	20.2487	20.2487	20.2757	20.1926	20.1038	20.0415	19.9768
alpha	2.3227	2.3250	2.3273	2.3382	2.3403	2.3499	2.3499	2.3517	2.3462	2.3403	2.3361	2.3318
util living area	0.9520	0.9255	0.8768	0.7805	0.6509	0.5067	0.3923	0.4441	0.6519	0.8486	0.9312	0.9572 (86)
MIT	17.9305	18.3347	18.9749	19.7718	20.3873	20.7609	20.9057	20.8713	20.5466	19.6894	18.6682	17.8615 (87)
Th 2	19.5822	19.5843	19.5864	19.5961	19.5979	19.6064	19.6064	19.6079	19.6031	19.5979	19.5942	19.5904 (88)
util rest of house	0.9431	0.9121	0.8546	0.7417	0.5898	0.4189	0.2805	0.3277	0.5671	0.8114	0.9164	0.9493 (89)
MIT 2	16.1057	16.6120	17.4057	18.3669	19.0627	19.4476	19.5664	19.5483	19.2637	18.3066	17.0469	16.0231 (90)
Living area fraction	fLA = Living area / (4) = 0.4850 (91)											
MIT	16.9907	17.4475	18.1667	19.0482	19.7051	20.0845	20.2159	20.1900	19.8859	18.9772	17.8332	16.9147 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.9907	17.4475	18.1667	19.0482	19.7051	20.0845	20.2159	20.1900	19.8859	18.9772	17.8332	16.9147 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9197	0.8846	0.8264	0.7241	0.5949	0.4507	0.3313	0.3788	0.5860	0.7911	0.8909	0.9273 (94)
Ext temp.	456.0903	533.7899	598.9520	638.0052	589.9338	449.2888	314.2660	322.2941	428.6217	465.2997	443.3685	435.3418 (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	1194.0635	1178.5086	1093.8898	943.7739	743.3249	505.6312	333.3570	348.9370	534.8960	777.8782	999.7428	1188.1423 (97)
Space heating requirement - total per year (kWh/year)	549.0521	433.2509	368.2337	220.1535	114.1230	0.0000	0.0000	0.0000	0.0000	232.5584	400.5895	560.0836 (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)	549.0521	433.2509	368.2337	220.1535	114.1230	0.0000	0.0000	0.0000	0.0000	232.5584	400.5895	560.0836 (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	2878.0447 (99)
Space heating per m2	(98c) / (4) = 50.2452 (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)	549.0521	433.2509	368.2337	220.1535	114.1230	0.0000	0.0000	0.0000	0.0000	232.5584	400.5895	560.0836 (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)	594.2122	468.8863	398.5213	238.2613	123.5097	0.0000	0.0000	0.0000	0.0000	251.6866	433.5384	606.1511 (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)
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	186.1988	164.7996	175.7594	154.9694	149.6383	134.2036	132.7007	138.9490	141.3314	158.0827	167.0518	184.4653 (64)
Efficiency of water heater (217)m	86.5525	86.3516	85.9267	85.1334	83.8079	80.3000	80.3000	80.3000	80.3000	85.2071	86.1837	86.6021 (216)
Fuel for water heating, kWh/month	215.1281	190.8473	204.5457	182.0314	178.5492	167.1278	165.2561	173.0374	176.0043	185.5276	193.8324	213.0033 (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)

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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	17.4011	13.9598	12.5692	9.2088	7.1131	5.8115	6.4888	8.4344	10.9555	14.3742	16.2356	17.8847	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.7571	-46.6356	-65.7354	-72.4785	-77.0319	-71.5657	-70.7223	-67.3222	-61.1329	-52.6881	-36.7885	-29.3026	(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	-22.1020	-46.1087	-90.9234	-135.5164	-178.1666	-178.5965	-176.4473	-149.8192	-110.4118	-65.5264	-29.3771	-17.5029	(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												3114.7670	(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												2244.8905	(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)												140.4366	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1885.6593	(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												3700.4347	(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	3114.7670	0.2100	654.1011	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2244.8905	0.2100	471.4270	(264)
Space and water heating			1125.5281	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	140.4366	0.1443	20.2693	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-685.1609	0.1350	-92.4876	
PV Unit electricity exported	-1200.4985	0.1261	-151.4201	
Total			-243.9077	(269)
Total CO2, kg/year			913.8190	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9500	(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	3114.7670	1.1300	3519.6867	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2244.8905	1.1300	2536.7262	(278)
Space and water heating			6056.4129	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	140.4366	1.5338	215.4064	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-685.1609	1.4989	-1026.9944	
PV Unit electricity exported	-1200.4985	0.4630	-555.8295	
Total			-1582.8239	(283)
Total Primary energy kWh/year			4819.0962	(286)
Target Primary Energy Rate (TPER)			84.1300	(287)