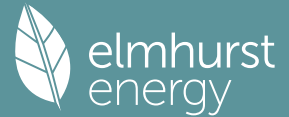


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Property Reference	Maisonette GF				Issued on Date	28/08/2025
Assessment Reference	Proposed		Prop Type Ref			
Property						
SAP Rating	88 B	DER	3.31	TER	12.44	
Environmental	98 A	% DER < TER				73.39
CO ₂ Emissions (t/year)	0.18	DFEE	29.03	TFEE	32.71	
Compliance Check	See BREL	% DFEE < TFEE				11.26
% DPER < TPER	46.45	DPER	34.88	TPER	65.14	
Assessor Details	Mr. Michael Woodbridge				Assessor ID	M818-0001
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	57.2400	2.4000	137.3760
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2400		
Dwelling volume			137.3760

2. Ventilation rate

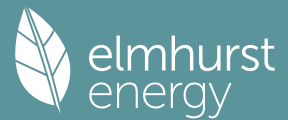
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1456 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3456 (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) = 0.2937 (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	0.3745	0.3672	0.3598	0.3231	0.3158	0.2791	0.2791	0.2717	0.2937	0.3158	0.3305	0.3452 (22b)
Effective ac	0.5701	0.5674	0.5647	0.5522	0.5499	0.5389	0.5389	0.5369	0.5431	0.5499	0.5546	0.5596 (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							
Windows			8.3800	1.0536	8.8295		(27)
Patio Door			3.3600	1.0536	3.5402		(27)
Ground Floor			57.2400	0.1200	6.8688	75.0000	4293.0000 (28a)
External Wall Stone	50.5000	11.7400	38.7600	0.1800	6.9768	9.0000	348.8400 (29a)
Total net area of external elements Aum(A, m ²)			107.7400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.2153		(33)
Main dwelling							
Party W			29.0400	0.0000	0.0000	20.0000	580.8000 (32)
Party Ceiling			57.2400			30.0000	1717.2000 (32b)
Int W			96.2800			9.0000	866.5200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	7806.3600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.3795 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.2400	0.1830	1.5079	
E3 Sill				5.5800	0.0330	0.1841	
E4 Jamb				17.2000	0.0330	0.5676	
E5 Ground floor (normal)				21.0400	0.1710	3.5978	
E16 Corner (normal)				2.4000	0.0460	0.1104	

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E7 Party floor between dwellings (in blocks of flats)	21.0400	0.0485	1.0204									
P1 Party wall - Ground floor	12.1000	0.1600	1.9360									
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.1000	0.0000	0.0000									
E18 Party wall between dwellings	9.6000	0.0840	0.8064									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				9.7307 (36)								
Point Thermal bridges				0.0000								
Total fabric heat loss		(33) + (36) + (36a) =		35.9461 (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	25.8466	25.7231	25.6021	25.0337	24.9273	24.4322	24.4322	24.3405	24.6229	24.9273	25.1425	25.3674 (38)
Average = Sum(39)m / 12 =	61.7927	61.6692	61.5482	60.9797	60.8734	60.3783	60.3783	60.2866	60.5690	60.8734	61.0885	61.3135 (39)
												60.9792
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0795	1.0774	1.0753	1.0653	1.0635	1.0548	1.0548	1.0532	1.0582	1.0635	1.0672	1.0712 (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													1.9026 (42)
Hot water usage for mixer showers	56.1203	55.2769	54.0479	51.6965	49.9612	48.0261	46.9261	48.1458	49.4828	51.5606	53.9625	55.9053 (42a)	
Hot water usage for baths	24.2568	23.8965	23.3892	22.4539	21.7535	20.9768	20.5573	21.0611	21.6096	22.4406	23.3952	24.1748 (42b)	
Hot water usage for other uses	34.1148	32.8742	31.6337	30.3932	29.1526	27.9121	27.9121	29.1526	30.3932	31.6337	32.8742	34.1148 (42c)	
Average daily hot water use (litres/day)												105.2443 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	114.4918	112.0477	109.0709	104.5435	100.8673	96.9150	95.3955	98.3595	101.4855	105.6349	110.2319	114.1948 (44)	
Energy content (annual)	181.3271	159.5544	167.6378	143.1149	135.7868	119.1683	115.3726	121.7896	125.1418	143.3455	157.0456	178.8015 (45)	
Distribution loss (46)m = 0.15 x (45)m	27.1991	23.9332	25.1457	21.4672	20.3680	17.8752	17.3059	18.2684	18.7713	21.5018	23.5568	26.8202 (46)	
Water storage loss:													
Store volume												210.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3200 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7128 (55)	
Total storage loss	22.0968	19.9584	22.0968	21.3840	22.0968	21.3840	22.0968	22.0968	21.3840	22.0968	21.3840	22.0968 (56)	
If cylinder contains dedicated solar storage	22.0968	19.9584	22.0968	21.3840	22.0968	21.3840	22.0968	22.0968	21.3840	22.0968	21.3840	22.0968 (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	226.6863	200.5240	212.9970	187.0109	181.1460	163.0643	160.7318	167.1488	169.0378	188.7047	200.9416	224.1607 (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	226.6863	200.5240	212.9970	187.0109	181.1460	163.0643	160.7318	167.1488	169.0378	188.7047	200.9416	224.1607 (64)	
12Total per year (kWh/year)												2282.1538 (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	96.5786	85.8275	92.0269	82.7025	81.4365	74.7403	74.6488	76.7824	76.7264	83.9497	87.3345	95.7388 (65)	

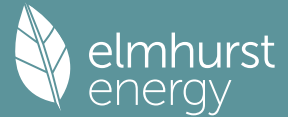
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.0819	93.0907	84.0819	86.8847	84.0819	86.8847	84.0819	84.0819	86.8847	84.0819	86.8847	84.0819 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.9365	167.6584	163.3193	154.0818	142.4211	131.4617	124.1401	122.4182	126.7573	135.9949	147.6555	158.6150 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131 (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)	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049 (71)
Water heating gains (Table 5)	129.8100	127.7195	123.6921	114.8646	109.4576	103.8059	100.3344	103.2022	106.5645	112.8357	121.2979	128.6812 (72)
Total internal gains	431.3678	440.0080	422.6327	407.3704	387.5000	373.6916	360.0957	361.2416	371.7459	384.4518	407.3774	422.9175 (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				0.7700	10.6334	0.6300	0.0000		0.7700		3.9719 (74)	
South				6.2100	46.7521	0.6300	0.0000		0.7700		140.8392 (78)	
West				1.4000	19.6403	0.6300	0.0000		0.7700		13.3385 (80)	
North				3.3600	10.6334	0.6300	0.0000		0.7700		17.3317 (74)	
Solar gains	175.4813	297.4636	405.9693	505.8701	572.5417	571.8941	549.8481	498.9877	440.0818	328.2108	209.8548	150.4267 (83)
Total gains	606.8491	737.4716	828.6020	913.2404	960.0417	945.5857	909.9439	860.2294	811.8276	712.6626	617.2322	573.3442 (84)

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7. Mean internal temperature (heating season)

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

21.0000 (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	35.0921	35.1623	35.2315	35.5599	35.6220	35.9141	35.9141	35.9687	35.8010	35.6220	35.4966	35.3663
alpha	3.3395	3.3442	3.3488	3.3707	3.3748	3.3943	3.3943	3.3979	3.3867	3.3748	3.3664	3.3578
util living area	0.9223	0.8688	0.7978	0.6832	0.5445	0.3968	0.2888	0.3177	0.4869	0.7238	0.8758	0.9328 (86)
Living	19.5914	19.9490	20.3089	20.6588	20.8700	20.9664	20.9913	20.9879	20.9321	20.6486	20.0764	19.5192
Non living	18.4147	18.8511	19.2824	19.6904	19.9171	20.0149	20.0338	20.0331	19.9849	19.6925	19.0224	18.3305
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.2794	19.9490	20.3089	20.6588	20.8700	20.9664	20.9913	20.9879	20.9321	20.6486	20.0764	19.7263 (87)
Th 2	20.0176	20.0193	20.0211	20.0292	20.0308	20.0379	20.0379	20.0392	20.0351	20.0308	20.0277	20.0245 (88)
util rest of house	0.9103	0.8507	0.7717	0.6466	0.4974	0.3409	0.2269	0.2532	0.4267	0.6821	0.8554	0.9222 (89)
MIT 2	19.3786	18.8511	19.2824	19.6904	19.9171	20.0149	20.0338	20.0331	19.9849	19.6925	19.0224	18.6358 (90)
Living area fraction									FLA = Living area / (4) =			0.4095 (91)
MIT	19.7475	19.3007	19.7028	20.0870	20.3073	20.4045	20.4259	20.4241	20.3728	20.0840	19.4540	19.0824 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7475	19.3007	19.7028	20.0870	20.3073	20.4045	20.4259	20.4241	20.3728	20.0840	19.4540	19.0824 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9067	0.8355	0.7625	0.6489	0.5112	0.3625	0.2521	0.2793	0.4483	0.6846	0.8416	0.9101 (94)
Useful gains	550.2120	616.1915	631.7989	592.5688	490.7761	342.7767	229.3549	240.2290	363.9150	487.8560	519.4597	521.7723 (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	954.5406	888.0769	812.6062	682.1781	523.9551	350.4683	231.0013	242.5990	379.9343	577.3258	754.6886	912.4890 (97)
Space heating kWh	300.8204	182.7070	134.5206	64.5187	24.6852	0.0000	0.0000	0.0000	0.0000	66.5656	169.3648	290.6933 (98a)
Space heating requirement - total per year (kWh/year)												1233.8756
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	300.8204	182.7070	134.5206	64.5187	24.6852	0.0000	0.0000	0.0000	0.0000	66.5656	169.3648	290.6933 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1233.8756
Space heating per m2										(98c) / (4) =		21.5562 (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 %)

310.7703 (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	300.8204	182.7070	134.5206	64.5187	24.6852	0.0000	0.0000	0.0000	0.0000	66.5656	169.3648	290.6933 (98)
Space heating efficiency (main heating system 1)	310.7703	310.7703	310.7703	310.7703	310.7703	0.0000	0.0000	0.0000	0.0000	310.7703	310.7703	310.7703 (210)
Space heating fuel (main heating system)	96.7983	58.7916	43.2862	20.7609	7.9432	0.0000	0.0000	0.0000	0.0000	21.4195	54.4984	93.5396 (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	226.6863	200.5240	212.9970	187.0109	181.1460	163.0643	160.7318	167.1488	169.0378	188.7047	200.9416	224.1607 (64)
Efficiency of water heater	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544	310.2544 (216)
Fuel for water heating, kWh/month	73.0647	64.6321	68.6524	60.2766	58.3863	52.5583	51.8065	53.8748	54.4836	60.8226	64.7667	72.2506 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	20.2424	16.2392	14.6216	10.7124	8.2746	6.7604	7.5484	9.8116	12.7443	16.7213	18.8866	20.8050 (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												397.0378 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												310.2544
Water heating fuel used												735.5751 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

Total electricity for the above, kWh/year

0.0000 (231)

Electricity for lighting (calculated in Appendix L)

163.3679 (232)

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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	1295.9808 (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	397.0378	0.1567	62.2142 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	735.5751	0.1409	103.6480 (264)
Space and water heating			165.8622 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	163.3679	0.1443	23.5790 (268)
Total CO2, kg/year			189.4412 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3100 (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	397.0378	1.5800	627.3354 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	735.5751	1.5210	1118.8282 (278)
Space and water heating			1746.1637 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	163.3679	1.5338	250.5792 (282)
Total Primary energy kWh/year			1996.7428 (286)
Dwelling Primary energy Rate (DPER)			34.8800 (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	57.2400 (1b)	2.4000 (2b)	137.3760 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 137.3760 (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)

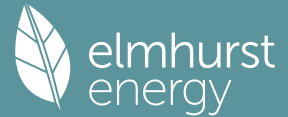
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1456 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3956	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3362 (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	0.4287	0.4203	0.4119	0.3699	0.3615	0.3194	0.3194	0.3110	0.3362	0.3615	0.3783	0.3951 (22b)
Effective ac	0.5919	0.5883	0.5848	0.5684	0.5653	0.5510	0.5510	0.5484	0.5565	0.5653	0.5715	0.5780 (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			11.7400	1.1450	13.4427		(27)
TER Opening Type							

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Ground Floor				57.2400	0.1300	7.4412	(28a)
External Wall Stone	50.5000	11.7400		38.7600	0.1800	6.9768	
Total net area of external elements Aum(A, m2)				107.7400			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		27.8607	(33)
Main dwelling							
Party W			29.0400	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 146.3795 (35)

List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.2400	0.0500	0.4120	
E3 Sill				5.5800	0.0500	0.2790	
E4 Jamb				17.2000	0.0500	0.8600	
E5 Ground floor (normal)				21.0400	0.1600	3.3664	
E16 Corner (normal)				2.4000	0.0900	0.2160	
E7 Party floor between dwellings (in blocks of flats)				21.0400	0.0700	1.4728	
P1 Party wall - Ground floor				12.1000	0.0800	0.9680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				12.1000	0.0000	0.0000	
E18 Party wall between dwellings				9.6000	0.0600	0.5760	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.1502 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 36.0109 (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	26.8332	26.6714	26.5128	25.7680	25.6287	24.9800	24.9800	24.8598	25.2298	25.6287	25.9106	26.2053	(38)
Average = Sum(39)m / 12 =	62.8441	62.6824	62.5238	61.7790	61.6396	60.9909	60.9909	60.8708	61.2408	61.6396	61.9215	62.2162	(39)
												61.7783	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0979	1.0951	1.0923	1.0793	1.0769	1.0655	1.0655	1.0634	1.0699	1.0769	1.0818	1.0869	(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													1.9026 (42)
Hot water usage for mixer showers													
Hot water usage for baths	56.1203	55.2769	54.0479	51.6965	49.9612	48.0261	46.9261	48.1458	49.4828	51.5606	53.9625	55.9053	(42a)
Hot water usage for other uses	24.2568	23.8965	23.3892	22.4539	21.7535	20.9768	20.5573	21.0611	21.6096	22.4406	23.3952	24.1748	(42b)
Average daily hot water use (litres/day)	34.1148	32.8742	31.6337	30.3932	29.1526	27.9121	27.9121	29.1526	30.3932	31.6337	32.8742	34.1148	(42c)
												105.2443	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	114.4918	112.0477	109.0709	104.5435	100.8673	96.9150	95.3955	98.3595	101.4855	105.6349	110.2319	114.1948	(44)
Energy content (annual)	181.3271	159.5544	167.6378	143.1149	135.7868	119.1683	115.3726	121.7896	125.1418	143.3455	157.0456	178.8015	(45)
Distribution loss (46)m = 0.15 x (45)m													
	27.1991	23.9332	25.1457	21.4672	20.3680	17.8752	17.3059	18.2684	18.7713	21.5018	23.5568	26.8202	(46)

Water storage loss: Store volume 210.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.7016 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.9188 (55)

Total storage loss 28.4842 25.7277 28.4842 27.5653 28.4842 27.5653 28.4842 28.4842 27.5653 28.4842 27.5653 28.4842 28.4842 (56)

If cylinder contains dedicated solar storage 28.4842 25.7277 28.4842 27.5653 28.4842 27.5653 28.4842 28.4842 27.5653 28.4842 27.5653 28.4842 28.4842 (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 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 0.0000 (61)

Total heat required for water heating calculated for each month 233.0737 206.2932 219.3844 193.1922 187.5334 169.2456 167.1192 173.5362 175.2191 195.0921 207.1230 230.5481 (62)

WWHRS -25.6558 -22.6902 -23.7599 -19.6741 -18.3356 -15.6899 -14.7068 -15.6392 -16.2334 -19.1374 -21.6803 -25.1807 (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 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 0.0000 (63d)

Output from w/h 207.4178 183.6030 195.6245 173.5181 169.1978 153.5557 152.4124 157.8970 158.9857 175.9547 185.4426 205.3673 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2118.9768 (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 0.0000 (64a)

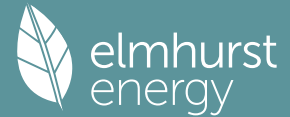
Heat gains from water heating, kWh/month 101.6885 90.4429 97.1369 87.6476 86.5464 79.6853 79.7587 81.8923 81.6715 89.0596 92.2795 100.8488 (65)

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	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	95.1312	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	84.0819	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	165.9365	167.6584	163.3193	154.0818	142.4211	131.4617	124.1401	122.4182	126.7573	135.9949	147.6555	158.6150	(68)
Pumps, fans	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	32.5131	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	-76.1049	(71)
Total internal gains	136.6781	134.5877	130.5603	121.7327	116.3258	110.6741	107.2025	110.0703	113.4327	119.7038	128.1660	135.5494	(72)
	441.2359	449.8761	432.5008	417.2385	397.3681	380.5597	366.9639	368.1098	378.6140	394.3200	417.2456	432.7856	(73)

6. Solar gains

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[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	4.1300	10.6334	0.6300	0.7000	0.7700	13.4213 (74)
South	6.2100	46.7521	0.6300	0.7000	0.7700	88.7287 (78)
West	1.4000	19.6403	0.6300	0.7000	0.7700	8.4032 (80)

Solar gains	110.5532	187.4021	255.7607	318.6982	360.7013	360.2933	346.4043	314.3623	277.2515	206.7728	132.2085	94.7688 (83)
Total gains	551.7892	637.2782	688.2615	735.9367	758.0694	740.8531	713.3682	682.4721	655.8655	601.0928	549.4541	527.5545 (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	37.0350	37.1306	37.2248	37.6736	37.7587	38.1603	38.1603	38.2356	38.0046	37.7587	37.5868	37.4088
alpha	3.4690	3.4754	3.4817	3.5116	3.5172	3.5440	3.5440	3.5490	3.5336	3.5172	3.5058	3.4939
util living area	0.9460	0.9145	0.8699	0.7844	0.6600	0.4997	0.3688	0.3999	0.5882	0.8030	0.9136	0.9524 (86)
MIT	19.5096	19.7943	20.1287	20.5165	20.7927	20.9425	20.9849	20.9797	20.8952	20.5499	19.9820	19.4617 (87)
Th 2	20.0025	20.0049	20.0071	20.0178	20.0198	20.0291	20.0291	20.0308	20.0255	20.0198	20.0157	20.0115 (88)
util rest of house	0.9366	0.9005	0.8488	0.7507	0.6097	0.4323	0.2905	0.3198	0.5205	0.7650	0.8971	0.9440 (89)
MIT 2	18.2986	18.6517	19.0619	19.5282	19.8352	19.9895	20.0221	20.0207	19.9470	19.5792	18.8983	18.2453 (90)
Living area fraction	FLA = Living area / (4) = 0.4095 (91)											
MIT	18.7945	19.1196	19.4988	19.9329	20.2273	20.3798	20.4163	20.4134	20.3353	19.9767	19.3421	18.7434 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.7945	19.1196	19.4988	19.9329	20.2273	20.3798	20.4163	20.4134	20.3353	19.9767	19.3421	18.7434 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9225	0.8857	0.8365	0.7476	0.6209	0.4572	0.3221	0.3519	0.5429	0.7631	0.8837	0.9305 (94)
Useful gains	509.0109	564.4515	575.7648	550.1822	470.6525	338.7522	229.7823	240.1698	356.0408	458.7026	485.5343	490.9123 (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	910.8929	891.3199	812.7333	681.6018	525.6190	352.5125	232.7626	244.3014	381.8534	577.9760	758.0484	904.8378 (97)
Space heating kWh	299.0002	219.6556	176.3045	94.6221	40.8951	0.0000	0.0000	0.0000	0.0000	88.7394	196.2101	307.9606 (98a)
Space heating requirement - total per year (kWh/year)	1423.3877											
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	299.0002	219.6556	176.3045	94.6221	40.8951	0.0000	0.0000	0.0000	0.0000	88.7394	196.2101	307.9606 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1423.3877											
Space heating per m2	(98c) / (4) = 24.8670 (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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	299.0002	219.6556	176.3045	94.6221	40.8951	0.0000	0.0000	0.0000	0.0000	88.7394	196.2101	307.9606 (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)	323.9439	237.9801	191.0125	102.5158	44.3068	0.0000	0.0000	0.0000	0.0000	96.1424	212.5787	333.6518 (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	207.4178	183.6030	195.6245	173.5181	169.1978	153.5557	152.4124	157.8970	158.9857	175.9547	185.4426	205.3673 (64)
Efficiency of water heater (217)m	84.8792	84.4629	83.8273	82.7599	81.4060	79.8000	79.8000	79.8000	79.8000	82.6068	84.1866	79.8000 (216)
Fuel for water heating, kWh/month	244.3683	217.3771	233.3660	209.6644	207.8444	192.4257	190.9930	197.8659	199.2303	213.0026	220.2758	84.9663 (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	17.4706	14.0155	12.6194	9.2455	7.1415	5.8347	6.5147	8.4681	10.9992	14.4316	16.3004	17.9561 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-27.1267	-38.4276	-55.5191	-62.7848	-68.0481	-63.6837	-62.9324	-59.2561	-52.7970	-44.1363	-29.9012	-23.4340 (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	-14.7786	-31.1489	-62.0058	-93.2523	-123.4009	-123.9872	-122.4934	-103.6427	-75.8953	-44.5479	-19.7361	-11.6793 (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	1542.1319 (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	79.8000	
Water heating fuel used	2568.1181	(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)	140.9975	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1414.6152	(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	2922.6322	(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	1542.1319	0.2100	323.8477 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2568.1181	0.2100	539.3048 (264)
Space and water heating			863.1525 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	140.9975	0.1443	20.3503 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-588.0469	0.1345	-79.0679
PV Unit electricity exported	-826.5683	0.1259	-104.0353
Total			-183.1032 (269)
Total CO2, kg/year			712.3288 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.4400 (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	1542.1319	1.1300	1742.6090 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2568.1181	1.1300	2901.9734 (278)
Space and water heating			4644.5825 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	140.9975	1.5338	216.2666 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-588.0469	1.4969	-880.2641
PV Unit electricity exported	-826.5683	0.4620	-381.8806
Total			-1262.1447 (283)
Total Primary energy kWh/year			3728.8052 (286)
Target Primary Energy Rate (TPER)			65.1400 (287)