

Full SAP Calculation Printout



Property Reference	2B4P				Issued on Date	28/08/2025	
Assessment Reference	Proposed			Prop Type Ref			
Property							
SAP Rating	87 B		DER	3.30		TER	11.33
Environmental	97 A		% DER < TER				70.87
CO ₂ Emissions (t/year)	0.25		DFEE	34.43		TFEE	36.00
Compliance Check	See BREL		% DFEE < TFEE				4.37
% DPER < TPER	41.38		DPER	34.64		TPER	59.10
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			
Ground floor	39.8100 (1b)	x 2.3800 (2b)	= 94.7478 (1b) - (3b)
First floor	39.8100 (1c)	x 2.7000 (2c)	= 107.4870 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 202.2348 (5)

2. Ventilation rate

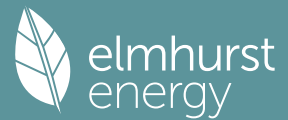
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1483 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3483 (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) = 0.2961 (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	0.3775	0.3701	0.3627	0.3257	0.3183	0.2813	0.2813	0.2739	0.2961	0.3183	0.3331	0.3479 (22b)
Effective ac	0.5713	0.5685	0.5658	0.5530	0.5507	0.5396	0.5396	0.5375	0.5438	0.5507	0.5555	0.5605 (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			9.0000	1.0536	9.4828		(27)
Patio Door			5.0400	1.0536	5.3103		(27)
Ground Floor			39.8100	0.1200	4.7772	75.0000	2985.7500 (28a)
External Wall STone	91.0300	14.0400	76.9900	0.1800	13.8582	9.0000	692.9100 (29a)
Plane Ceiling	39.8100		39.8100	0.0800	3.1848	9.0000	358.2900 (30)
Total net area of external elements Aum(A, m ²)			170.6500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.6133		(33)
Main dwelling							
Party W			46.3600	0.0000	0.0000	20.0000	927.2000 (32)
Int W			163.1000			9.0000	1467.9000 (32c)
Int F			39.8100			18.0000	716.5800 (32d)
Int C			39.8100			9.0000	358.2900 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	7506.9200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							94.2844 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				7.7900	0.1830	1.4256	
E3 Sill				4.3300	0.0330	0.1429	

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E4 Jamb	15.0000	0.0330	0.4950
E5 Ground floor (normal)	17.8500	0.1710	3.0524
E10 Eaves (insulation at ceiling level)	8.7600	0.0350	0.3066
E12 Gable (insulation at ceiling level)	9.0900	0.1080	0.9817
E16 Corner (normal)	10.2000	0.0460	0.4692
E6 Intermediate floor within a dwelling	17.8500	0.0670	1.1960
P1 Party wall - Ground floor	9.0900	0.1600	1.4544
P2 Party wall - Intermediate floor within a dwelling	9.0900	0.0000	0.0000
E18 Party wall between dwellings	10.2000	0.0840	0.8568
P4 Party wall - Roof (insulation at ceiling level)	9.0900	0.2400	2.1816

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

Point Thermal bridges

Total fabric heat loss

(33) + (36) + (36a) = 49.1754 (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	38.1244	37.9397	37.7587	36.9085	36.7494	36.0089	36.0089	35.8718	36.2942	36.7494	37.0712	37.4077 (38)
Average = Sum(39)m / 12 =	87.2998	87.1151	86.9341	86.0839	85.9248	85.1843	85.1843	85.0472	85.4696	85.9248	86.2466	86.5831 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0965	1.0941	1.0919	1.0812	1.0792	1.0699	1.0699	1.0682	1.0735	1.0792	1.0832	1.0875 (40)
HLP (average)												1.0812
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4556 (42)
Hot water usage for mixer showers	65.3922	64.4095	62.9775	60.2376	58.2156	55.9607	54.6791	56.1002	57.6581	60.0792	62.8779	65.1417	(42a)
Hot water usage for baths	28.2440	27.8246	27.2339	26.1447	25.3292	24.4249	23.9365	24.5230	25.1617	26.1293	27.2409	28.1485	(42b)
Hot water usage for other uses	39.7779	38.3314	36.8850	35.4385	33.9920	32.5456	32.5456	33.9920	35.4385	36.8850	38.3314	39.7779	(42c)
Average daily hot water use (litres/day)													122.6379 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.4142	130.5655	127.0964	121.8209	117.5369	112.9312	111.1611	114.6153	118.2583	123.0935	128.4502	133.0682	(44)
Energy content (annual)	211.2954	185.9236	195.3424	166.7667	158.2272	138.8621	134.4397	141.9177	145.8243	167.0367	183.0009	208.3526	(45)
Distribution loss (46)m = 0.15 x (45)m	31.6943	27.8885	29.3014	25.0150	23.7341	20.8293	20.1660	21.2877	21.8736	25.0555	27.4501	31.2529	(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	256.6546	226.8932	240.7016	210.6627	203.5864	182.7581	179.7989	187.2769	189.7203	212.3959	226.8969	253.7118	(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	256.6546	226.8932	240.7016	210.6627	203.5864	182.7581	179.7989	187.2769	189.7203	212.3959	226.8969	253.7118	(64)
12Total per year (kWh/year)													2571.0573 (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	106.5431	94.5953	101.2387	90.5667	88.8979	81.2885	80.9886	83.4750	83.6034	91.8271	95.9646	105.5646	(65)

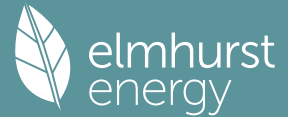
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.0162	125.1250	113.0162	116.7834	113.0162	116.7834	113.0162	113.0162	116.7834	113.0162	116.7834	113.0162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	218.6445	220.9134	215.1959	203.0242	187.6596	173.2191	163.5719	161.3031	167.0205	179.1922	194.5568	208.9973 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781 (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)	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245 (71)
Water heating gains (Table 5)	143.2031	140.7668	136.0735	125.7871	119.4864	112.9006	108.8556	112.1976	116.1158	123.4235	133.2842	141.8879 (72)
Total internal gains	534.6979	546.6393	524.1198	505.4289	479.9964	462.7373	445.2778	446.3510	459.7538	475.4660	504.4585	523.7356 (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
East	5.0200	19.6403	0.6300	0.0000	0.7700	47.8280 (76)
West	3.9800	19.6403	0.6300	0.0000	0.7700	37.9194 (80)
West	5.0400	19.6403	0.6300	0.0000	0.7700	48.0186 (80)

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Solar gains	133.7660	261.6746	430.9409	628.5016	770.2523	788.4903	750.6749	644.8186	501.2021	310.4990	166.7905	110.0026 (83)
Total gains	668.4639	808.3140	955.0607	1133.9304	1250.2487	1251.2275	1195.9527	1091.1696	960.9559	785.9650	671.2490	633.7382 (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	23.8861	23.9368	23.9866	24.2235	24.2684	24.4793	24.4793	24.5188	24.3976	24.2684	24.1778	24.0839
alpha	2.5924	2.5958	2.5991	2.6149	2.6179	2.6320	2.6320	2.6346	2.6265	2.6179	2.6119	2.6056
util living area	0.9236	0.8825	0.8135	0.6920	0.5501	0.4067	0.3031	0.3427	0.5345	0.7683	0.8897	0.9318 (86)
Living	18.7270	19.1345	19.6900	20.3013	20.6968	20.9008	20.9663	20.9529	20.7923	20.2113	19.3650	18.6556
Non living	17.3662	17.8729	18.5551	19.2869	19.7329	19.9492	20.0065	19.9988	19.8500	19.2067	18.1761	17.2814
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	19.8372	19.1345	19.6900	20.3013	20.6968	20.9008	20.9663	20.9529	20.7923	20.2113	19.3650	18.9835 (87)
Th 2	20.0037	20.0056	20.0075	20.0162	20.0179	20.0255	20.0255	20.0269	20.0226	20.0179	20.0146	20.0111 (88)
util rest of house	0.9139	0.8683	0.7920	0.6596	0.5064	0.3520	0.2395	0.2753	0.4755	0.7341	0.8739	0.9230 (89)
MIT 2	18.9523	17.8729	18.5551	19.2869	19.7329	19.9492	20.0065	19.9988	19.8500	19.2067	18.1761	17.7733 (90)
Living area fraction	19.1275	18.1228	18.7799	19.4878	19.9238	20.1377	20.1966	20.1878	20.0366	19.4057	18.4115	18.0130 (92)
MIT	19.1275	18.1228	18.7799	19.4878	19.9238	20.1377	20.1966	20.1878	20.0366	19.4057	18.4115	18.0130 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1275	18.1228	18.7799	19.4878	19.9238	20.1377	20.1966	20.1878	20.0366	19.4057	18.4115	18.0130 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9039	0.8349	0.7611	0.6406	0.5020	0.3584	0.2509	0.2868	0.4763	0.7097	0.8414	0.9000 (94)
Useful gains	604.2006	674.8320	726.8584	726.4067	627.6157	448.5014	300.0064	312.9078	457.7507	557.7957	564.8080	570.3757 (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	1294.4412	1151.9026	1067.5419	911.4392	706.6292	471.7230	306.3763	322.1411	507.4016	756.6265	975.5830	1195.9714 (97)
Space heating kWh	513.5390	320.5914	253.4685	133.2234	58.7860	0.0000	0.0000	0.0000	0.0000	147.9301	295.7580	465.4432 (98a)
Space heating requirement - total per year (kWh/year)												2188.7397
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	513.5390	320.5914	253.4685	133.2234	58.7860	0.0000	0.0000	0.0000	0.0000	147.9301	295.7580	465.4432 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2188.7397
Space heating per m2										(98c) / (4) =		27.4898 (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 %)												307.5847 (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	513.5390	320.5914	253.4685	133.2234	58.7860	0.0000	0.0000	0.0000	0.0000	147.9301	295.7580	465.4432 (98)
Space heating efficiency (main heating system 1)	307.5847	307.5847	307.5847	307.5847	307.5847	0.0000	0.0000	0.0000	0.0000	307.5847	307.5847	307.5847 (210)
Space heating fuel (main heating system)	166.9586	104.2287	82.4061	43.3128	19.1121	0.0000	0.0000	0.0000	0.0000	48.0941	96.1550	151.3220 (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	256.6546	226.8932	240.7016	210.6627	203.5864	182.7581	179.7989	187.2769	189.7203	212.3959	226.8969	253.7118 (64)
Efficiency of water heater (217)m	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911	306.3911 (217)
Fuel for water heating, kWh/month	83.7670	74.0535	78.5602	68.7561	66.4466	59.6486	58.6828	61.1235	61.9210	69.3218	74.0547	82.8065 (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	29.0324	23.2908	20.9708	15.3641	11.8677	9.6960	10.8261	14.0722	18.2784	23.9822	27.0879	29.8393 (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												711.5893 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												306.3911
Water heating fuel used												839.1424 (219)

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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)	234.3079 (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	1785.0396 (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	711.5893	0.1559	110.9412 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	839.1424	0.1410	118.3047 (264)
Space and water heating			229.2459 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	234.3079	0.1443	33.8179 (268)
Total CO2, kg/year			263.0637 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3000 (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	711.5893	1.5771	1122.2684 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	839.1424	1.5213	1276.5937 (278)
Space and water heating			2398.8621 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	234.3079	1.5338	359.3892 (282)
Total Primary energy kWh/year			2758.2514 (286)
Dwelling Primary energy Rate (DPER)			34.6400 (287)

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

1. Overall dwelling characteristics

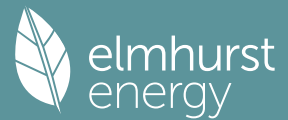
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	39.8100 (1b)	x 2.3800 (2b)	= 94.7478 (1b) - (3b)
First floor	39.8100 (1c)	x 2.7000 (2c)	= 107.4870 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	202.2348 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1483 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3983 (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) = 0.3386 (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	0.4317	0.4232	0.4148	0.3725	0.3640	0.3217	0.3217	0.3132	0.3386	0.3640	0.3809	0.3978 (22b)
Effective ac	0.5932	0.5896	0.5860	0.5694	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791 (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 Opening Type			14.0400	1.1450	16.0763			(27)
Ground Floor			39.8100	0.1300	5.1753			(28a)
External Wall STone	91.0300	14.0400	76.9900	0.1800	13.8582			(29a)
Plane Ceiling	39.8100		39.8100	0.1100	4.3791			(30)
Total net area of external elements Aum(A, m2)			170.6500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.4889			(33)
Main dwelling								
Party W			46.3600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							94.2844	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				7.7900	0.0500		0.3895	
E3 Sill				4.3300	0.0500		0.2165	
E4 Jamb				15.0000	0.0500		0.7500	
E5 Ground floor (normal)				17.8500	0.1600		2.8560	
E10 Eaves (insulation at ceiling level)				8.7600	0.0600		0.5256	
E12 Gable (insulation at ceiling level)				9.0900	0.0600		0.5454	
E16 Corner (normal)				10.2000	0.0900		0.9180	
E6 Intermediate floor within a dwelling				17.8500	0.0000		0.0000	
P1 Party wall - Ground floor				9.0900	0.0800		0.7272	
P2 Party wall - Intermediate floor within a dwelling				9.0900	0.0000		0.0000	
E18 Party wall between dwellings				10.2000	0.0600		0.6120	
P4 Party wall - Roof (insulation at ceiling level)				9.0900	0.1200		1.0908	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.6310	(36)
Point Thermal bridges							0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	48.1199	(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	39.5876	39.3461	39.1094	37.9976	37.7896	36.8213	36.8213	36.6420	37.1943	37.7896	38.2104	38.6504	(38)
Average = Sum(39)m / 12 =	87.7075	87.4661	87.2294	86.1176	85.9095	84.9412	84.9412	84.7619	85.3142	85.9095	86.3304	86.7703	(39)
												86.1166	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1016	1.0985	1.0956	1.0816	1.0790	1.0668	1.0668	1.0646	1.0715	1.0790	1.0843	1.0898	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

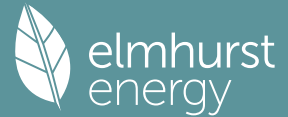
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4556	(42)
Hot water usage for mixer showers														
65.3922	64.4095	62.9775	60.2376	58.2156	55.9607	54.6791	56.1002	57.6581	60.0792	62.8779	65.1417	65.1417	(42a)	
Hot water usage for baths														
28.2440	27.8246	27.2339	26.1447	25.3292	24.4249	23.9365	24.5230	25.1617	26.1293	27.2409	28.1485	28.1485	(42b)	
Hot water usage for other uses														
39.7779	38.3314	36.8850	35.4385	33.9920	32.5456	32.5456	33.9920	35.4385	36.8850	38.3314	39.7779	39.7779	(42c)	
Average daily hot water use (litres/day)													122.6379	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
133.4142	130.5655	127.0964	121.8209	117.5369	112.9312	111.1611	114.6153	118.2583	123.0935	128.4502	133.0682	133.0682	(44)	
Energy content	211.2954	185.9236	195.3424	166.7667	158.2272	138.8621	134.4397	141.9177	145.8243	167.0367	183.0009	208.3526	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m														
31.6943	27.8885	29.3014	25.0150	23.7341	20.8293	20.1660	21.2877	21.8736	25.0555	27.4501	31.2529	31.2529	(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	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	(61)	
Total heat required for water heating calculated for each month														
263.0420	232.6624	247.0890	216.8440	209.9738	188.9395	186.1863	193.6643	195.9017	218.7833	233.0783	260.0992	260.0992	(62)	
WWHRS	-29.8946	-26.4390	-27.6854	-22.9246	-21.3649	-18.2821	-17.1366	-18.2230	-18.9154	-22.2992	-25.2622	-29.3410	(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														
233.1474	206.2234	219.4035	193.9194	188.6089	170.6573	169.0497	175.4412	176.9863	196.4841	207.8160	230.7582	230.7582	(64)	
12Total per year (kWh/year)													2368.4955	(64)
Electric shower(s)													2368	(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)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
111.6530	99.2107	106.3486	95.5118	94.0078	86.2335	86.0985	88.5849	88.5485	96.9370	100.9097	110.6745	110.6745	(65)	

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

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	122.7806	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.0162	125.1250	113.0162	116.7834	113.0162	116.7834	113.0162	113.0162	116.7834	113.0162	116.7834	113.0162	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	218.6445	220.9134	215.1959	203.0242	187.6596	173.2191	163.5719	161.3031	167.0205	179.1922	194.5568	208.9973	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	35.2781	(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)	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	-98.2245	(71)
Water heating gains (Table 5)													

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Total internal gains	150.0712	147.6349	142.9417	132.6553	126.3546	119.7688	115.7238	119.0657	122.9840	130.2916	140.1523	148.7560 (72)
	544.5661	556.5075	533.9879	515.2970	489.8646	469.6054	452.1460	453.2191	466.6220	485.3341	514.3267	533.6037 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
East	5.0200		19.6403		0.6300		0.7000		0.7700		30.1316 (76)	
West	9.0200		19.6403		0.6300		0.7000		0.7700		54.1409 (80)	
Solar gains	84.2726	164.8550	271.4928	395.9560	485.2589	496.7489	472.9252	406.2357	315.7573	195.6144	105.0780	69.3017 (83)
Total gains	628.8387	721.3625	805.4807	911.2530	975.1235	966.3543	925.0712	859.4549	782.3793	680.9485	619.4046	602.9054 (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	23.7751	23.8407	23.9054	24.2141	24.2727	24.5494	24.5494	24.6013	24.4421	24.2727	24.1544	24.0319
alpha	2.5850	2.5894	2.5937	2.6143	2.6182	2.6366	2.6366	2.6401	2.6295	2.6182	2.6103	2.6021
util living area	0.9326	0.9051	0.8596	0.7699	0.6483	0.5010	0.3811	0.4211	0.6155	0.8133	0.9052	0.9385 (86)
MIT	18.6293	18.9590	19.4514	20.0743	20.5461	20.8373	20.9420	20.9234	20.7076	20.0756	19.2633	18.5821 (87)
Th 2	19.9995	20.0020	20.0045	20.0159	20.0180	20.0280	20.0280	20.0280	20.0242	20.0180	20.0137	20.0092 (88)
util rest of house	0.9238	0.8930	0.8416	0.7409	0.6043	0.4391	0.3044	0.3424	0.5549	0.7827	0.8911	0.9304 (89)
MIT 2	17.2422	17.6555	18.2685	19.0315	19.5804	19.8991	19.9943	19.9827	19.7744	19.0538	18.0517	17.1886 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.5170	17.9137	18.5028	19.2380	19.7717	20.0849	20.1820	20.1690	19.9592	19.2562	18.2917	17.4646 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.5170	17.9137	18.5028	19.2380	19.7717	20.0849	20.1820	20.1690	19.9592	19.2562	18.2917	17.4646 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8940	0.8604	0.8086	0.7148	0.5924	0.4429	0.3169	0.3541	0.5505	0.7547	0.8593	0.9019 (94)
Useful gains	562.2026	620.6764	651.2735	651.4077	577.6615	427.9775	293.1829	304.3361	430.6890	513.8961	532.2396	543.7774 (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	1159.2272	1138.2554	1046.9971	890.2852	693.4357	465.8935	304.2594	319.4679	499.8772	743.6465	966.1793	1150.9736 (97)
Space heating kWh	444.1863	347.8131	294.4184	171.9918	86.1360	0.0000	0.0000	0.0000	0.0000	170.9343	312.4366	451.7540 (98a)
Space heating requirement - total per year (kWh/year)	2279.6705											
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	444.1863	347.8131	294.4184	171.9918	86.1360	0.0000	0.0000	0.0000	0.0000	170.9343	312.4366	451.7540 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2279.6705											
Space heating per m2	(98c) / (4) = 28.6319 (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	444.1863	347.8131	294.4184	171.9918	86.1360	0.0000	0.0000	0.0000	0.0000	170.9343	312.4366	451.7540 (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)	481.2419	376.8289	318.9799	186.3400	93.3218	0.0000	0.0000	0.0000	0.0000	185.1942	338.5012	489.4410 (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	233.1474	206.2234	219.4035	193.9194	188.6089	170.6573	169.0497	175.4412	176.9863	196.4841	207.8160	230.7582 (64)
Efficiency of water heater	85.4815	85.2224	84.7200	83.7917	82.4189	79.8000	79.8000	79.8000	79.8000	83.7489	84.9719	79.8000 (216)
Fuel for water heating, kWh/month	272.7460	241.9826	258.9748	231.4302	228.8419	213.8563	211.8418	219.8512	221.7873	234.6109	244.5702	269.7718 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.4825	18.8386	16.9620	12.4271	9.5991	7.8425	8.7566	11.3821	14.7843	19.3978	21.9097	24.1352 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-37.1094	-52.2474	-75.0047	-84.2245	-90.7312	-84.6538	-83.6002	-78.9599	-70.7653	-59.6828	-40.7696	-32.0909 (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)												

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(233b)m	-21.1802	-44.5325	-88.4707	-132.8208	-175.5716	-176.3936	-174.3244	-147.6299	-108.2437	-63.6755	-28.2751	-16.7512	(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												2469.8488	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2850.2651	(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)												189.5174	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1967.7090	(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												3627.9224	(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	2469.8488	0.2100	518.6683 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2850.2651	0.2100	598.5557 (264)
Space and water heating			1117.2239 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	189.5174	0.1443	27.3532 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-789.8397	0.1346	-106.3236
PV Unit electricity exported	-1177.8693	0.1259	-148.3029
Total			-254.6265 (269)
Total CO2, kg/year			901.8800 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3300 (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	2469.8488	1.1300	2790.9292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2850.2651	1.1300	3220.7995 (278)
Space and water heating			6011.7287 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	189.5174	1.5338	290.6882 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-789.8397	1.4975	-1182.7949
PV Unit electricity exported	-1177.8693	0.4622	-544.3741
Total			-1727.1690 (283)
Total Primary energy kWh/year			4705.3487 (286)
Target Primary Energy Rate (TPER)			59.1000 (287)