

Full SAP Calculation Printout



Property Reference	UNIT 41			Issued on Date	02/07/2025
Assessment Reference	UNIT 41	Prop Type Ref			
Property	Flat 42, Alexander House, 205 Kings Road, READING, RG1 4FW				
SAP Rating	85 B	DER	4.67	TER	12.97
Environmental	97 A	% DER < TER			63.99
CO ₂ Emissions (t/year)	0.18	DFEE	41.99	TFEE	42.44
Compliance Check	See BREL	% DFEE < TFEE			1.06
% DPER < TPER	28.94	DPER	49.18	TPER	69.21
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Built) (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	43.2000 (1b)	2.5000 (2b)	108.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	108.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.8400	(17)
Infiltration rate	0.1920	(18)
Number of sides sheltered	3	(19)

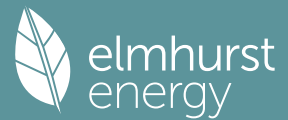
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1488 (21)

	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	0.1897	0.1860	0.1823	0.1637	0.1600	0.1414	0.1414	0.1376	0.1488	0.1600	0.1674	0.1748 (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) =												79.2000 (23c)
Effective ac	0.2937	0.2900	0.2863	0.2677	0.2640	0.2454	0.2454	0.2416	0.2528	0.2640	0.2714	0.2788 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
1			6.5000	1.1450	7.4427		(27)
2			6.5000	1.1450	7.4427		(27)
1			2.1000	1.0000	2.1000		(26)
top floor exposed new	25.2500	13.0000	12.2500	0.2000	2.4500	18.0000	220.5000 (29a)
corridor new	25.2500	2.1000	23.1500	0.2300	5.3245	14.0000	324.1000 (29a)
flat roof new	20.8000		20.8000	0.1300	2.7040	9.0000	187.2000 (30)
roof terrace new	22.4000		22.4000	0.1300	2.9120	9.0000	201.6000 (30)
Total net area of external elements A _{um} (A, m ²)			93.7000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.3760		(33)
Main dwelling							
pw			21.5000	0.0000	0.0000	20.0000	430.0000 (32)
pf			43.2000			30.0000	1296.0000 (32d)
iw			56.0000			9.0000	504.0000 (32c)
Heat capacity C _m = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	3163.4000 (34)

Full SAP Calculation Printout



Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												73.2269 (35)
List of Thermal Bridges												
K1 Element												
E2 Other lintels (including other steel lintels)						Length	Psi-value	Total				
E3 Sill						6.2000	0.0470	0.2914				
E4 Jamb						5.2000	0.0150	0.0780				
E15 Flat roof with parapet						14.2000	0.0470	0.6674				
E18 Party wall between dwellings						10.0000	0.1970	1.9700				
E24 Eaves (insulation at ceiling level - inverted)						5.0000	0.2400	1.2000				
Point Thermal Bridges						10.0000	0.0500	0.5000				

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

Point Thermal Bridges (36a) = 4.7068 (36)

Total fabric heat loss (33) + (36) + (36a) = 35.0828 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	10.4682	10.3356	10.2030	9.5401	9.4075	8.7446	8.7446	8.6120	9.0098	9.4075	9.6727	9.9379 (38)
Average = Sum(39)m / 12 =	45.5510	45.4184	45.2858	44.6229	44.4903	43.8274	43.8274	43.6948	44.0926	44.4903	44.7555	45.0207 (39)
												44.5898
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0544	1.0514	1.0483	1.0329	1.0299	1.0145	1.0145	1.0115	1.0207	1.0299	1.0360	1.0421 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	1.0322
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4937 (42)
Hot water usage for mixer showers												
	49.2646	48.5243	47.4454	45.3813	43.8580	42.1592	41.1936	42.2643	43.4380	45.2619	47.3704	49.0759 (42a)
Hot water usage for baths												
	21.3086	20.9922	20.5465	19.7248	19.1096	18.4273	18.0588	18.5013	18.9832	19.7132	20.5518	21.2366 (42b)
Hot water usage for other uses												
	29.9274	28.8392	27.7509	26.6626	25.5744	24.4861	24.4861	25.5744	26.6626	27.7509	28.8392	29.9274 (42c)
Average daily hot water use (litres/day)												92.3836 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	100.5007	98.3556	95.7429	91.7687	88.5419	85.0726	83.7385	86.3400	89.0838	92.7260	96.7614	100.2399 (44)
Energy content (annual)	159.1686	140.0571	147.1532	125.6268	119.1944	104.6067	101.2745	106.9070	109.8492	125.8283	137.8543	156.9515 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1534.4716
	23.8753	21.0086	22.0730	18.8440	17.8792	15.6910	15.1912	16.0360	16.4774	18.8742	20.6782	23.5427 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												1.5500 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.8370 (55)
	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (56)
If cylinder contains dedicated solar storage												
	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (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												
	208.3780	184.5043	196.3626	173.2488	168.4038	152.2287	150.4839	156.1164	157.4712	175.0377	185.4763	206.1609 (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	208.3780	184.5043	196.3626	173.2488	168.4038	152.2287	150.4839	156.1164	157.4712	175.0377	185.4763	206.1609 (64)
										Total per year (kWh/year) = Sum(64)m =		2113.8726 (64)
12Total per year (kWh/year)												2114 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month	92.2911	82.1267	88.2960	79.8685	78.9997	72.8793	73.0413	74.9141	74.6225	81.2054	83.9342	91.5539 (65)

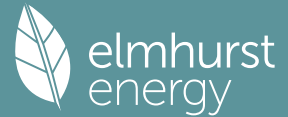
5. Internal gains (see Table 5 and 5a)

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	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	65.3971	72.4040	65.3971	67.5770	65.3971	67.5770	65.3971	65.3971	67.5770	65.3971	67.5770	65.3971 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	129.6572	131.0026	127.6121	120.3943	111.2830	102.7197	96.9989	95.6534	99.0439	106.2618	115.3730	123.9363 (68)
Pumps, fans	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498 (71)
Water heating gains (Table 5)												
	124.0471	122.2124	118.6774	110.9285	106.1823	101.2213	98.1738	100.6910	103.6423	109.1471	116.5752	123.0563 (72)
Total internal gains	364.5076	371.0252	357.0928	344.3060	328.2687	316.9242	305.9760	307.1477	315.6694	326.2122	344.9315	357.7960 (73)

6. Solar gains

[Jan]			Area	Solar flux		g		FF		Access		Gains
			m2	Table 6a		Specific data		Specific data		factor		W
				W/m2		or Table 6b		or Table 6c		Table 6d		
West			6.5000	19.6403		0.6300		0.8000		0.7700		44.5887 (80)
West			6.5000	19.6403		0.6300		0.8000		0.7700		44.5887 (80)
Solar gains	89.1773	174.4498	287.2939	419.0010	513.5015	525.6602	500.4499	429.8791	334.1347	206.9993	111.1936	73.3351 (83)
Total gains	453.6849	545.4749	644.3867	763.3070	841.7702	842.5844	806.4259	737.0268	649.8041	533.2115	456.1251	431.1311 (84)

Full SAP Calculation Printout



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	19.2910	19.3473	19.4039	19.6922	19.7509	20.0496	20.0496	20.1104	19.9290	19.7509	19.6338	19.5182
alpha	2.2861	2.2898	2.2936	2.3128	2.3167	2.3366	2.3366	2.3407	2.3286	2.3167	2.3089	2.3012
util living area	0.8484	0.7901	0.7029	0.5712	0.4383	0.3155	0.2326	0.2631	0.4220	0.6476	0.7970	0.8602 (86)
Living	18.7988	19.2389	19.8036	20.3853	20.7345	20.9124	20.9688	20.9578	20.8214	20.3051	19.4732	18.7299
Non living	17.4946	18.0343	18.7187	19.4106	19.8040	20.0006	20.0520	20.0465	19.9132	19.3427	18.3437	17.4158
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	19.8739	19.2389	19.8036	20.3853	20.7345	20.9124	20.9688	20.9578	20.8214	20.3051	19.4732	19.0474 (87)
Th 2	20.0382	20.0408	20.0433	20.0560	20.0585	20.0712	20.0712	20.0738	20.0662	20.0585	20.0534	20.0484 (88)
util rest of house	0.8341	0.7719	0.6790	0.5407	0.4020	0.2736	0.1855	0.2130	0.3740	0.6125	0.7762	0.8468 (89)
MIT 2	19.0240	18.0343	18.7187	19.4106	19.8040	20.0006	20.0520	20.0465	19.9132	19.3427	18.3437	17.8901 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.4883	18.6924	19.3114	19.9431	20.3123	20.4987	20.5529	20.5443	20.4094	19.8684	18.9607	18.5224 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4883	18.6924	19.3114	19.9431	20.3123	20.4987	20.5529	20.5443	20.4094	19.8684	18.9607	18.5224 (93)
8. Space heating requirement												
Utilisation	0.8251	0.7426	0.6591	0.5369	0.4120	0.2931	0.2102	0.2387	0.3920	0.6049	0.7487	0.8215 (94)
Useful gains	374.3284	405.0641	424.7045	409.8367	346.7807	246.9669	169.4812	175.9266	254.7371	322.5339	341.5168	354.1787 (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	691.8417	626.4283	580.1747	492.7734	383.1650	258.5255	173.2443	181.0855	278.1962	412.3550	530.8327	644.8019 (97)
Space heating kWh	236.2300	148.7567	115.6699	59.7144	27.0699	0.0000	0.0000	0.0000	0.0000	66.8269	136.3074	216.2237 (98a)
Space heating requirement - total per year (kWh/year)												1006.7988
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	236.2300	148.7567	115.6699	59.7144	27.0699	0.0000	0.0000	0.0000	0.0000	66.8269	136.3074	216.2237 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1006.7988
Space heating per m2										(98c) / (4) =		23.3055 (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 %)												197.7008 (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	236.2300	148.7567	115.6699	59.7144	27.0699	0.0000	0.0000	0.0000	0.0000	66.8269	136.3074	216.2237 (98)
Space heating efficiency (main heating system 1)	197.7008	197.7008	197.7008	197.7008	197.7008	0.0000	0.0000	0.0000	0.0000	197.7008	197.7008	197.7008 (210)
Space heating fuel (main heating system)	119.4886	75.2434	58.5075	30.2044	13.6924	0.0000	0.0000	0.0000	0.0000	33.8020	68.9463	109.3691 (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	208.3780	184.5043	196.3626	173.2488	168.4038	152.2287	150.4839	156.1164	157.4712	175.0377	185.4763	206.1609 (64)
Efficiency of water heater (217)m	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204	313.6204 (216)
Fuel for water heating, kWh/month	66.4427	58.8305	62.6116	55.2416	53.6967	48.5392	47.9828	49.7788	50.2108	55.8120	59.1404	65.7358 (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	7.5536	6.8226	7.5536	7.3100	7.5536	7.3100	7.5536	7.5536	7.3100	7.5536	7.3100	7.5536 (231)
Lighting	13.0636	10.4801	9.4362	6.9134	5.3401	4.3629	4.8714	6.3320	8.2247	10.7912	12.1887	13.4267 (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												509.2538 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												313.6204
Water heating fuel used												674.0227 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6750)	
mechanical ventilation fans (SFP = 0.6750)	88.9380 (230a)
Total electricity for the above, kWh/year	88.9380 (231)
Electricity for lighting (calculated in Appendix L)	105.4309 (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	1377.6454 (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	509.2538	0.1560	79.4290 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	674.0227	0.1408	94.8974 (264)
Space and water heating			174.3264 (265)
Pumps, fans and electric keep-hot	88.9380	0.1387	12.3368 (267)
Energy for lighting	105.4309	0.1443	15.2169 (268)
Total CO2, kg/year			201.8801 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (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	509.2538	1.5774	803.2813 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	674.0227	1.5206	1024.9154 (278)
Space and water heating			1828.1967 (279)
Pumps, fans and electric keep-hot	88.9380	1.5128	134.5454 (281)
Energy for lighting	105.4309	1.5338	161.7134 (282)
Total Primary energy kWh/year			2124.4556 (286)
Dwelling Primary energy Rate (DPER)			49.1800 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	43.2000 (1b)	x 2.5000 (2b)	= 108.0000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.2000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 108.0000 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1852 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4352 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3373 (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	0.4300	0.4216	0.4132	0.3710	0.3626	0.3204	0.3204	0.3120	0.3373	0.3626	0.3794	0.3963 (22b)
Effective ac	0.5925	0.5889	0.5853	0.5688	0.5657	0.5513	0.5513	0.5487	0.5569	0.5657	0.5720	0.5785 (25)

Full SAP Calculation Printout



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			2.1000	1.0000	2.1000		(26)
TER Opening Type			8.7000	1.1450	9.9618		(27)
top floor exposed new	25.2500	8.7000	16.5500	0.1800	2.9790		(29a)
corridor new	25.2500	2.1000	23.1500	0.1800	4.1670		(29a)
flat roof new	20.8000		20.8000	0.1100	2.2880		(30)
roof terrace new	22.4000		22.4000	0.1100	2.4640		(30)
Total net area of external elements Aum(A, m2)			93.7000				(31)
Fabric heat loss, W/K = Sum (A x U)					23.9598		(33)
Main dwelling pw			21.5000	0.0000	0.0000		(32)

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

73.2269 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2000	0.0500	0.3100
E3 Sill	5.2000	0.0500	0.2600
E4 Jamb	14.2000	0.0500	0.7100
E15 Flat roof with parapet	10.0000	0.5600	5.6000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
E24 Eaves (insulation at ceiling level - inverted)	10.0000	0.2400	2.4000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.5800 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 33.5398 (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	21.1152	20.9872	20.8618	20.2727	20.1625	19.6494	19.6494	19.5544	19.8470	20.1625	20.3855	20.6186 (38)
Heat transfer coeff	54.6550	54.5271	54.4016	53.8125	53.7023	53.1892	53.1892	53.0942	53.3869	53.7023	53.9253	54.1584 (39)
Average = Sum(39)m / 12 =												53.8120

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2652	1.2622	1.2593	1.2457	1.2431	1.2312	1.2312	1.2290	1.2358	1.2431	1.2483	1.2537 (40)
HLP (average)												1.2456
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

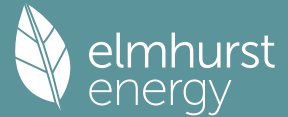
Assumed occupancy												1.4937 (42)
Hot water usage for mixer showers												
49.2646	48.5243	47.4454	45.3813	43.8580	42.1592	41.1936	42.2643	43.4380	45.2619	47.3704	49.0759 (42a)	
Hot water usage for baths												
21.3086	20.9922	20.5465	19.7248	19.1096	18.4273	18.0588	18.5013	18.9832	19.7132	20.5518	21.2366 (42b)	
Hot water usage for other uses												
29.9274	28.8392	27.7509	26.6626	25.5744	24.4861	24.4861	25.5744	26.6626	27.7509	28.8392	29.9274 (42c)	
Average daily hot water use (litres/day)												92.3836 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	100.5007	98.3556	95.7429	91.7687	88.5419	85.0726	83.7385	86.3400	89.0838	92.7260	96.7614	100.2399 (44)
Energy content (annual)	159.1686	140.0571	147.1532	125.6268	119.1944	104.6067	101.2745	106.9070	109.8492	125.8283	137.8543	156.9515 (45)
Distribution loss (46)m = 0.15 x (45)m	23.8753	21.0086	22.0730	18.8440	17.8792	15.6910	15.1912	16.0360	16.4774	18.8742	20.6782	23.5427 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	205.7635	182.1428	193.7481	170.7187	165.7893	149.6986	147.8694	153.5019	154.9410	172.4232	182.9462	203.5464 (62)
WWHRS	-22.5217	-19.9184	-20.8574	-17.2708	-16.0957	-13.7732	-12.9102	-13.7287	-14.2503	-16.7995	-19.0318	-22.1047 (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	183.2417	162.2244	172.8907	153.4479	149.6936	135.9253	134.9592	139.7732	140.6907	155.6237	163.9143	181.4417 (64)
12Total per year (kWh/year)												1873.8265 (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	90.1995	80.2376	86.2044	77.8444	76.9081	70.8552	70.9497	72.8225	72.5983	79.1138	81.9100	89.4623 (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	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873	74.6873 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.8113	72.8625	65.8113	68.0050	65.8113	68.0050	65.8113	65.8113	68.0050	65.8113	68.0050	65.8113 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	129.6572	131.0026	127.6121	120.3943	111.2830	102.7197	96.9989	95.6534	99.0439	106.2618	115.3730	123.9363 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687	30.4687 (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)	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498	-59.7498 (71)
Water heating gains (Table 5)	121.2358	119.4011	115.8661	108.1172	103.3711	98.4100	95.3625	97.8797	100.8310	106.3358	113.7639	120.2450 (72)
Total internal gains	365.1105	371.6724	357.6957	344.9227	328.8715	314.5409	303.5788	304.7506	313.2861	326.8150	345.5482	358.3988 (73)

Full SAP Calculation Printout



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

West				8.7000	19.6403	0.6300	0.7000			0.7700			52.2202 (80)

Solar gains	52.2202	102.1538	168.2327	245.3573	300.6946	307.8145	293.0519	251.7273	195.6616	121.2140	65.1124	42.9433	(83)
Total gains	417.3307	473.8262	525.9284	590.2800	629.5662	622.3553	596.6307	556.4779	508.9476	448.0291	410.6606	401.3422	(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	16.0776	16.1153	16.1525	16.3293	16.3628	16.5207	16.5207	16.5502	16.4595	16.3628	16.2952	16.2250
alpha	2.0718	2.0744	2.0768	2.0886	2.0909	2.1014	2.1014	2.1033	2.0973	2.0909	2.0863	2.0817
util living area	0.8821	0.8493	0.7985	0.7088	0.5956	0.4645	0.3570	0.3917	0.5633	0.7474	0.8473	0.8894 (86)
MIT	18.0748	18.4432	19.0142	19.7401	20.3257	20.7207	20.8854	20.8568	20.5563	19.7883	18.8285	18.0168 (87)
Th 2	19.8682	19.8706	19.8729	19.8836	19.8857	19.8951	19.8951	19.8968	19.8915	19.8857	19.8816	19.8773 (88)
util rest of house	0.8688	0.8329	0.7763	0.6767	0.5500	0.4013	0.2776	0.3108	0.5009	0.7119	0.8280	0.8769 (89)
MIT 2	16.5252	16.9799	17.6818	18.5604	19.2403	19.6737	19.8280	19.8084	19.5152	18.6434	17.4729	16.4568 (90)
Living area fraction									fLA = Living area / (4) =			0.5463 (91)
MIT	17.3717	17.7793	18.4097	19.2049	19.8332	20.2457	20.4056	20.3811	20.0839	19.2688	18.2135	17.3090 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3717	17.7793	18.4097	19.2049	19.8332	20.2457	20.4056	20.3811	20.0839	19.2688	18.2135	17.3090 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8311	0.7951	0.7423	0.6549	0.5477	0.4222	0.3153	0.3475	0.5125	0.6893	0.7923	0.8398 (94)
Useful gains	346.8366	376.7169	390.3731	386.5642	344.7866	262.7736	188.1222	193.3691	260.8165	308.8431	325.3464	337.0399 (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	714.4351	702.2695	647.9063	554.5312	436.7741	300.2896	202.4193	211.3746	319.4636	465.5371	599.2962	709.9613 (97)
Space heating kWh	273.4933	218.7713	191.6047	120.9363	68.4387	0.0000	0.0000	0.0000	0.0000	116.5804	197.2438	277.4536 (98a)
Space heating requirement - total per year (kWh/year)												1464.5221
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	273.4933	218.7713	191.6047	120.9363	68.4387	0.0000	0.0000	0.0000	0.0000	116.5804	197.2438	277.4536 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1464.5221
Space heating per m2										(98c) / (4) =		33.9010 (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	273.4933	218.7713	191.6047	120.9363	68.4387	0.0000	0.0000	0.0000	0.0000	116.5804	197.2438	277.4536 (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)	296.3091	237.0220	207.5891	131.0252	74.1481	0.0000	0.0000	0.0000	0.0000	126.3060	213.6986	300.5998 (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	183.2417	162.2244	172.8907	153.4479	149.6936	135.9253	134.9592	139.7732	140.6907	155.6237	163.9143	181.4417 (64)
Efficiency of water heater (217)m	84.9559	84.7311	84.2908	83.5314	82.4209	79.8000	79.8000	79.8000	79.8000	83.4211	84.4759	79.8000 (216)
Fuel for water heating, kWh/month	215.6904	191.4580	205.1122	183.7008	181.6209	170.3325	169.1218	175.1543	176.3042	186.5520	194.0367	213.4377 (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	13.6743	10.9700	9.8773	7.2365	5.5897	4.5668	5.0991	6.6280	8.6091	11.2957	12.7584	14.0543 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-34.6602	-46.2012	-62.8967	-66.9583	-69.3211	-63.8427	-63.1585	-61.0474	-56.8738	-51.1002	-37.1978	-30.3012 (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	-28.5931	-58.8200	-114.4994	-168.5694	-219.6586	-219.4341	-216.7295	-184.8375	-137.3787	-82.7626	-37.7264	-22.7000 (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)												

Full SAP Calculation Printout



(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												1586.6979	(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												2262.5215	(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)												110.3593	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2135.2683	(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												1910.3104	(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	1586.6979	0.2100	333.2066	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2262.5215	0.2100	475.1295	(264)
Space and water heating			808.3361	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	110.3593	0.1443	15.9283	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-643.5589	0.1357	-87.3436	
PV Unit electricity exported	-1491.7093	0.1265	-188.7141	
Total			-276.0577	(269)
Total CO2, kg/year			560.1359	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.9700	(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	1586.6979	1.1300	1792.9686	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2262.5215	1.1300	2556.6493	(278)
Space and water heating			4349.6179	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	110.3593	1.5338	169.2728	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-643.5589	1.5017	-966.4055	
PV Unit electricity exported	-1491.7093	0.4644	-692.7531	
Total			-1659.1587	(283)
Total Primary energy kWh/year			2989.8328	(286)
Target Primary Energy Rate (TPER)			69.2100	(287)