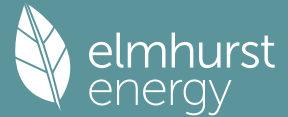


Full SAP Calculation Printout



Property Reference	Unit 1				Issued on Date	23/04/2025	
Assessment Reference	B2-0-1-1B2P			Prop Type Ref	B2-0-1		
Property							
SAP Rating		73 C	DER	6.40	TER	20.91	
Environmental		96 A	% DER < TER				69.39
CO ₂ Emissions (t/year)		0.25	DFEE	57.85	TFEE	59.66	
Compliance Check		See BREL	% DFEE < TFEE				3.03
% DPER < TPER		43.33	DPER	64.34	TPER	113.53	
Assessor Details	Mr. Callum MacGillivray				Assessor ID	U682-0001	
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	52.7000 (1b)	3.4000 (2b)	179.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	179.1800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)

	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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3026	0.2994	0.2962	0.2802	0.2771	0.2611	0.2611	0.2579	0.2675	0.2771	0.2834	0.2898 (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							
Window			12.9147	1.1450	14.7824		(27)
HLF			52.7000	0.1000	5.2700	110.0000	5797.0000 (28a)
Wall 1	50.8980	12.9147	37.9833	0.1500	5.6975	190.0000	7216.8268 (29a)
Shelt wall 1	30.8040		30.8040	0.1900	5.8528	190.0000	5852.7602 (29a)
HLR	2.3500		2.3500	0.1000	0.2350	9.0000	21.1500 (30)
Total net area of external elements Aum(A, m ²)			136.7473				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.8377		(33)
Main dwelling							
Party wall 1			24.0720	0.0000	0.0000	180.0000	4332.9601 (32)
Party ceiling 1			52.7000			30.0000	1581.0000 (32b)
Internal Wall 1			41.4100			75.0000	3105.7500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	27907.4470 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							529.5531 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.9100	0.0500	0.2955
E4 Jamb	21.7800	0.0500	1.0890
E5 Ground floor (normal)	24.0300	0.1600	3.8448
E7 Party floor between dwellings (in blocks of flats)	8.6900	0.0700	0.6083
E14 Flat roof	4.4300	0.0800	0.3544
E16 Corner (normal)	17.0000	0.0900	1.5300
E17 Corner (inverted - internal area greater than external area)	6.8000	-0.0900	-0.6120
E18 Party wall between dwellings	3.4000	0.0600	0.2040
E21 Exposed floor (inverted)	1.8500	0.3200	0.5920
E24 Eaves (insulation at ceiling level - inverted)	2.6000	0.2400	0.6240
E25 Staggered party wall between dwellings	3.4000	0.0600	0.2040
P1 Party wall - Ground floor	7.0800	0.0800	0.5664
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0800	0.0000	0.0000
P8 Party Wall - Exposed floor (inverted)	9.0600	0.2400	2.1744
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.4748 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.3125 (37)

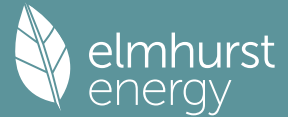
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.8903	17.7019	17.5134	16.5710	16.3825	15.4402	15.4402	15.2517	15.8171	16.3825	16.7595	17.1364	(38)
Heat transfer coeff	61.2028	61.0144	60.8259	59.8835	59.6950	58.7527	58.7527	58.5642	59.1296	59.6950	60.0720	60.4489	(39)
Average = Sum(39)m / 12 =												59.8364	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1613	1.1578	1.1542	1.1363	1.1327	1.1149	1.1149	1.1113	1.1220	1.1327	1.1399	1.1470	(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													1.7697 (42)
Hot water usage for mixer showers													
Hot water usage for baths	53.8919	53.0820	51.9018	49.6438	47.9774	46.1191	45.0628	46.2340	47.5179	49.5132	51.8197	53.6854	(42a)
Hot water usage for other uses	23.2985	22.9525	22.4652	21.5668	20.8941	20.1481	19.7452	20.2290	20.7559	21.5541	22.4710	23.2197	(42b)
Average daily hot water use (litres/day)	32.7537	31.5626	30.3716	29.1805	27.9895	26.7985	26.7985	27.9895	29.1805	30.3716	31.5626	32.7537	(42c)
Daily hot water use	109.9440	107.5971	104.7386	100.3911	96.8609	93.0656	91.6064	94.4526	97.4543	101.4388	105.8533	109.6588	(44)
Energy content (annual)	174.1244	153.2168	160.9793	137.4304	130.3934	114.4350	110.7900	116.9520	120.1709	137.6515	150.8075	171.6991	(45)
Distribution loss (46)m = 0.15 x (45)m	26.1187	22.9825	24.1469	20.6146	19.5590	17.1653	16.6185	17.5428	18.0256	20.6477	22.6211	25.7549	(46)
Water storage loss:													
Store volume													269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7700 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9558 (55)
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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	203.7542	179.9792	190.6091	166.1044	160.0232	143.1090	140.4198	146.5818	148.8449	167.2813	179.4815	201.3289	(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	203.7542	179.9792	190.6091	166.1044	160.0232	143.1090	140.4198	146.5818	148.8449	167.2813	179.4815	201.3289	(64)
12Total per year (kWh/year)													
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	57.8964	50.9446	53.5256	45.6956	43.3558	38.0497	36.8377	38.8865	39.9568	45.7691	50.1435	57.0900	(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	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.7967	86.1321	77.7967	80.3899	77.7967	80.3899	77.7967	77.7967	80.3899	77.7967	80.3899	77.7967	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	154.2407	155.8412	151.8079	143.2215	132.3827	122.1957	115.3902	113.7897	117.8230	126.4094	137.2482	147.4352	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	(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)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	(71)
Water heating gains (Table 5)	77.8177	75.8104	71.9430	63.4661	58.2740	52.8467	49.5130	52.2669	55.4956	61.5177	69.6437	76.7338	(72)
Total internal gains	359.4009	367.3294	351.0934	336.6233	317.9991	304.9782	292.2457	293.3990	303.2543	315.2695	336.8276	351.5115	(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		

Full SAP Calculation Printout



North			1.7040		10.6334		0.4000		0.8000		0.7700		4.0181 (74)
Northeast			3.0375		11.2829		0.4000		0.8000		0.7700		7.6001 (75)
East			8.1732		19.6403		0.4000		0.8000		0.7700		35.5978 (76)

Solar gains	47.2160	92.7859	155.6027	233.9903	294.7431	305.6554	289.3535	242.9081	183.0311	110.6765	58.9061	38.8302 (83)
Total gains	406.6169	460.1154	506.6961	570.6136	612.7422	610.6335	581.5992	536.3071	486.2854	425.9461	395.7337	390.3417 (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	126.6619	127.0532	127.4469	129.4525	129.8612	131.9441	131.9441	132.3688	131.1030	129.8612	129.0463	128.2416	
alpha	9.4441	9.4702	9.4965	9.6302	9.6574	9.7963	9.7963	9.8246	9.7402	9.6574	9.6031	9.5494	
util living area	0.9999	0.9996	0.9978	0.9769	0.8556	0.6137	0.4444	0.5020	0.8102	0.9916	0.9996	0.9999 (86)	
MIT	20.3362	20.4364	20.5938	20.8193	20.9666	20.9986	20.9999	20.9998	20.9848	20.7854	20.5251	20.3248 (87)	
Th 2	19.9510	19.9539	19.9568	19.9713	19.9742	19.9887	19.9887	19.9916	19.9829	19.9742	19.9684	19.9626 (88)	
util rest of house	0.9998	0.9993	0.9960	0.9588	0.7844	0.5181	0.3423	0.3922	0.7073	0.9819	0.9992	0.9999 (89)	
MIT 2	19.3564	19.4590	19.6181	19.8460	19.9598	19.9885	19.9887	19.9916	19.9787	19.8213	19.5603	19.3551 (90)	
Living area fraction									fLA = Living area / (4) =				0.6199 (91)
MIT	19.9638	20.0649	20.2229	20.4494	20.5839	20.6147	20.6156	20.6166	20.6024	20.4190	20.1584	19.9562 (92)	
Temperature adjustment												0.3000	
adjusted MIT	20.2638	20.3649	20.5229	20.7494	20.8839	20.9147	20.9156	20.9166	20.9024	20.7190	20.4584	20.2562 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9999	0.9994	0.9971	0.9734	0.8484	0.6058	0.4359	0.4930	0.8013	0.9896	0.9994	0.9999 (94)
Useful gains	406.5567	459.8531	505.2267	555.4175	519.8481	369.8953	253.5111	264.3838	389.6364	421.5368	395.5077	390.3028 (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	977.0297	943.5826	852.9576	709.5811	548.2350	371.0050	253.5531	264.5131	402.2245	604.0513	802.4657	970.5807 (97)
Space heating kWh	424.4319	325.0663	258.7118	110.9978	21.1198	0.0000	0.0000	0.0000	0.0000	135.7907	293.0097	431.7268 (98a)
Space heating requirement - total per year (kWh/year)												2000.8549
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	424.4319	325.0663	258.7118	110.9978	21.1198	0.0000	0.0000	0.0000	0.0000	135.7907	293.0097	431.7268 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2000.8549
Space heating per m2										(98c) / (4) =		37.9669 (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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (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	424.4319	325.0663	258.7118	110.9978	21.1198	0.0000	0.0000	0.0000	0.0000	135.7907	293.0097	431.7268 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	424.4319	325.0663	258.7118	110.9978	21.1198	0.0000	0.0000	0.0000	0.0000	135.7907	293.0097	431.7268 (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)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	203.7542	179.9792	190.6091	166.1044	160.0232	143.1090	140.4198	146.5818	148.8449	167.2813	179.4815	201.3289 (64)	
Efficiency of water heater (217)m	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330	338.5330 (216)	
Fuel for water heating, kWh/month	60.1874	53.1644	56.3044	49.0659	47.2696	42.2733	41.4789	43.2991	43.9676	49.4136	53.0174	59.4710 (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	16.3752	14.7905	16.3752	15.8470	16.3752	15.8470	16.3752	16.3752	15.8470	16.3752	15.8470	16.3752 (221)	
Lighting	15.5405	12.4672	11.2253	8.2242	6.3526	5.1901	5.7950	7.5326	9.7841	12.8373	14.4997	15.9725 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-34.1610	-52.3802	-79.9334	-89.3526	-89.9615	-81.5879	-80.5950	-75.3243	-65.5998	-59.1617	-38.6366	-29.0492 (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													2000.8549 (211)

Full SAP Calculation Printout



Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	338.5330	
Water heating fuel used	598.9128	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)		
mechanical ventilation fans (SFP = 0.8820)	192.8049	(230a)
Total electricity for the above, kWh/year	192.8049	(231)
Electricity for lighting (calculated in Appendix L)	125.4210	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-775.7433	(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	2142.2503	(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	2000.8549	0.1562	312.5199 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	598.9128	0.1411	84.4976 (264)
Space and water heating			397.0175 (265)
Pumps, fans and electric keep-hot	192.8049	0.1387	26.7444 (267)
Energy for lighting	125.4210	0.1443	18.1021 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-775.7433	0.1349	-104.6225
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-104.6225 (269)
Total CO2, kg/year			337.2416 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4000 (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	2000.8549	1.5783	3157.8906 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	598.9128	1.5217	911.3598 (278)
Space and water heating			4069.2504 (279)
Pumps, fans and electric keep-hot	192.8049	1.5128	291.6752 (281)
Energy for lighting	125.4210	1.5338	192.3750 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-775.7433	1.4985	-1162.4499
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1162.4499 (283)
Total Primary energy kWh/year			3390.8507 (286)
Dwelling Primary energy Rate (DPER)			64.3400 (287)

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

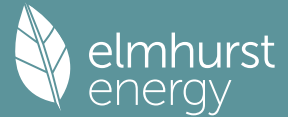
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	52.7000	3.4000	179.1800
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		179.1800 (1b) - (3b)
Dwelling volume			179.1800 (4)
			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 179.1800 (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	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1116 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Full SAP Calculation Printout



Infiltration rate													0.3616 (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) = 0.3074 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	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)
Adj infiltr rate	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)
Effective ac	0.3919	0.3842	0.3765	0.3381	0.3304	0.2920	0.2920	0.2843	0.3074	0.3304	0.3458	0.3612	(22b)
	0.5768	0.5738	0.5709	0.5572	0.5546	0.5426	0.5426	0.5404	0.5472	0.5546	0.5598	0.5652	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			12.9147	1.1450	14.7824			(27)
HLF			52.7000	0.1300	6.8510			(28a)
Wall 1	50.8980	12.9147	37.9833	0.1800	6.8370			(29a)
Shelt wall 1	30.8040		30.8040	0.1800	5.5447			(29a)
HLR	2.3500		2.3500	0.1100	0.2585			(30)
Total net area of external elements Aum(A, m2)			136.7473					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.2737			(33)
Main dwelling								
Party wall 1			24.0720	0.0000	0.0000			(32)

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

539.5531 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	5.9100	0.0500	0.2955	
E2 Other lintels (including other steel lintels)				
E4 Jamb	21.7800	0.0500	1.0890	
E5 Ground floor (normal)	24.0300	0.1600	3.8448	
E7 Party floor between dwellings (in blocks of flats)	8.6900	0.0700	0.6083	
E14 Flat roof	4.4300	0.0800	0.3544	
E16 Corner (normal)	17.0000	0.0900	1.5300	
E17 Corner (inverted - internal area greater than external area)	6.8000	-0.0900	-0.6120	
E18 Party wall between dwellings	3.4000	0.0600	0.2040	
E21 Exposed floor (inverted)	1.8500	0.3200	0.5920	
E24 Eaves (insulation at ceiling level - inverted)	2.6000	0.2400	0.6240	
E25 Staggered party wall between dwellings	3.4000	0.0600	0.2040	
P1 Party wall - Ground floor	7.0800	0.0800	0.5664	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0800	0.0000	0.0000	
P8 Party Wall - Exposed floor (inverted)	9.0600	0.2400	2.1744	

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

11.4748 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 45.7485 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

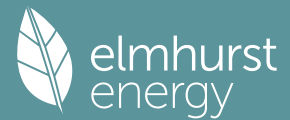
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	34.1055	33.9292	33.7564	32.9446	32.7927	32.0856	32.0856	31.9547	32.3580	32.7927	33.1000	33.4212	(38)
Average = Sum(39)m / 12 =	79.8540	79.6777	79.5048	78.6930	78.5411	77.8341	77.8341	77.7032	78.1064	78.5411	78.8484	79.1696	(39)
												78.6923	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5153	1.5119	1.5086	1.4932	1.4903	1.4769	1.4769	1.4744	1.4821	1.4903	1.4962	1.5023	(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													1.7697 (42)
Hot water usage for mixer showers													
Hot water usage for baths	53.8919	53.0820	51.9018	49.6438	47.9774	46.1191	45.0628	46.2340	47.5179	49.5132	51.8197	53.6854	(42a)
Hot water usage for other uses	23.2985	22.9525	22.4652	21.5668	20.8941	20.1481	19.7452	20.2290	20.7559	21.5541	22.4710	23.2197	(42b)
Average daily hot water use (litres/day)	32.7537	31.5626	30.3716	29.1805	27.9895	26.7985	26.7985	27.9895	29.1805	30.3716	31.5626	32.7537	(42c)
												101.0639	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	109.9440	107.5971	104.7386	100.3911	96.8609	93.0656	91.6064	94.4526	97.4543	101.4388	105.8533	109.6588	(44)
Energy content (annual)	174.1244	153.2168	160.9793	137.4304	130.3934	114.4350	110.7900	116.9520	120.1709	137.6515	150.8075	171.6991	(45)
Distribution loss (46)m = 0.15 x (45)m	26.1187	22.9825	24.1469	20.6146	19.5590	17.1653	16.6185	17.5428	18.0256	20.6477	22.6211	25.7549	(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													
Primary 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	(57)
Combi 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)
Total heat required for water heating calculated for each month	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)
WWHRS	220.7194	195.3025	207.5742	182.5222	176.9884	159.5269	157.3849	163.5469	165.2628	184.2464	195.8993	218.2940	(62)
PV diverter	-24.6371	-21.7893	-22.8165	-18.8929	-17.6075	-15.0669	-14.1228	-15.0182	-15.5888	-18.3775	-20.8194	-24.1809	(63a)
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	(63b)
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	(63c)
Output from w/h	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)
	196.0822	173.5133	184.7578	163.6293	159.3808	144.4600	143.2621	148.5287	149.6740	165.8690	175.0799	194.1132	(64)
12Total per year (kWh/year)													
Electric shower(s)													1998.3503 (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	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													

Full SAP Calculation Printout



95.1723 84.6132 90.8015 81.7691 80.6317 74.1231 74.1136 76.1625 76.0303 83.0451 86.2170 94.3659 (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	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.7967	86.1321	77.7967	80.3899	77.7967	80.3899	77.7967	77.7967	80.3899	77.7967	80.3899	77.7967	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	154.2407	155.8412	151.8079	143.2215	132.3827	122.1957	115.3902	113.7897	117.8230	126.4094	137.2482	147.4352	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	(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)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	(71)
Water heating gains (Table 5)	127.9198	125.9124	122.0451	113.5682	108.3760	102.9488	99.6151	102.3689	105.5976	111.6197	119.7458	126.8359	(72)
Total internal gains	412.5029	420.4315	404.1955	389.7254	371.1012	355.0802	342.3478	343.5011	353.3563	368.3716	389.9297	404.6135	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				1.7040	10.6334		0.6300	0.7000		0.7700		5.5375 (74)
Northeast				3.0375	11.2829		0.6300	0.7000		0.7700		10.4739 (75)
East				8.1732	19.6403		0.6300	0.7000		0.7700		49.0582 (76)
Solar gains	65.0696	127.8706	214.4400	322.4678	406.1928	421.2313	398.7652	334.7577	252.2398	152.5261	81.1799	53.5129 (83)
Total gains	477.5725	548.3021	618.6354	712.1932	777.2940	776.3115	741.1130	678.2588	605.5961	520.8977	471.1096	458.1264 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	98.9112	99.1301	99.3456	100.3705	100.5646	101.4781	101.4781	101.6491	101.1243	100.5646	100.1727	99.7662	
alpha	7.5941	7.6087	7.6230	7.6914	7.7043	7.7652	7.7652	7.7766	7.7416	7.7043	7.6782	7.6511	
util living area	0.9997	0.9991	0.9960	0.9706	0.8558	0.6342	0.4615	0.5253	0.8278	0.9885	0.9991	0.9998	(86)
MIT	20.1214	20.2455	20.4489	20.7317	20.9329	20.9940	20.9995	20.9988	20.9613	20.6894	20.3572	20.1041	(87)
Th 2	19.6761	19.6786	19.6810	19.6926	19.6947	19.7048	19.7048	19.7067	19.7010	19.6947	19.6904	19.6858	(88)
util rest of house	0.9995	0.9984	0.9926	0.9468	0.7723	0.5104	0.3260	0.3787	0.7052	0.9746	0.9983	0.9997	(89)
MIT 2	18.6878	18.8486	19.1093	19.4617	19.6583	19.7034	19.7048	19.7066	19.6872	19.4220	19.0012	18.6732	(90)
Living area fraction									fLA = Living area / (4) =			0.6199	(91)
MIT	19.5766	19.7146	19.9397	20.2490	20.4484	20.5035	20.5074	20.5077	20.4770	20.2077	19.8418	19.5602	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5766	19.7146	19.9397	20.2490	20.4484	20.5035	20.5074	20.5077	20.4770	20.2077	19.8418	19.5602	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9995	0.9984	0.9934	0.9587	0.8237	0.5877	0.4101	0.4699	0.7832	0.9814	0.9984	0.9996	(94)
Ext temp.	477.3378	547.4418	614.5584	682.7813	640.2741	456.2656	303.9540	318.6974	474.3041	511.2333	470.3623	457.9635	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1219.8938	1180.3907	1068.5247	893.0880	687.1127	459.4932	304.1318	319.1790	498.0873	754.6008	1004.6717	1216.0643	(97)
Space heating requirement - total per year (kWh/year)	552.4616	425.3416	337.7510	151.4208	34.8480	0.0000	0.0000	0.0000	0.0000	181.0655	384.7028	564.0270	(98a)
Solar heating kWh												2631.6183	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh	552.4616	425.3416	337.7510	151.4208	34.8480	0.0000	0.0000	0.0000	0.0000	181.0655	384.7028	564.0270	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2631.6183	
Space heating per m ²										(98c) / (4) =		49.9358	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

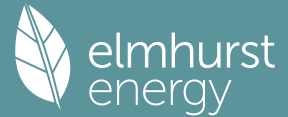
Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
552.4616	425.3416	337.7510	151.4208	34.8480	0.0000	0.0000	0.0000	0.0000	0.0000	181.0655	384.7028	564.0270	(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)	598.5500	460.8252	365.9274	164.0529	37.7551	0.0000	0.0000	0.0000	0.0000	196.1706	416.7961	611.0801	(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)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP			
	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	2851.1574	0.2100	598.7431 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	2396.7601	0.2100	503.3196 (264)
Space and water heating			1102.0627 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	130.4577	0.1443	18.8291 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-163.6659	0.1326	-21.7016
PV Unit electricity exported	-73.1367	0.1248	-9.1267
Total			-30.8283 (269)
Total CO ₂ , kg/year			1101.9927 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			20.9100 (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	2851.1574	1.1300	3221.8079 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2396.7601	1.1300	2708.3389 (278)
Space and water heating			5930.1467 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	130.4577	1.5338	200.1004 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-163.6659	1.4899	-243.8527
PV Unit electricity exported	-73.1367	0.4580	-33.4973
Total			-277.3500 (283)
Total Primary energy kWh/year			5982.9980 (286)
Target Primary Energy Rate (TPER)			113.5300 (287)

Full SAP Calculation Printout



Property Reference	Unit 2				Issued on Date	23/04/2025	
Assessment Reference	A1-0-4-2B3P			Prop Type Ref	A1-0-4-2B3P		
Property							
SAP Rating	80 C		DER	5.67		TER	15.92
Environmental	96 A		% DER < TER				64.38
CO ₂ Emissions (t/year)	0.3		DFEE	41.31		TFEE	42.54
Compliance Check	See BREL		% DFEE < TFEE				2.90
% DPER < TPER	32.11		DPER	58.62		TPER	86.35
Assessor Details	Mr. Callum MacGillivray					Assessor ID	U682-0001
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	68.3300 (1b)	3.4000 (2b)	232.3220 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	232.3220 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	3	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												71.2000 (23c)
Effective ac	0.2922	0.2893	0.2864	0.2719	0.2690	0.2544	0.2544	0.2515	0.2602	0.2690	0.2748	0.2806 (25)

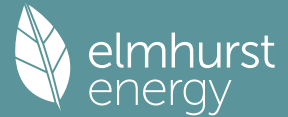
3. Heat losses and heat loss parameter

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							
Window			13.5657	1.1450	15.5382		(27)
HLF			68.3300	0.1000	6.8330	110.0000	7516.3000 (28a)
Wall 1	44.8800	13.5657	31.3143	0.1500	4.6971	190.0000	5949.7172 (29a)
Shelt wall 1	21.6920		21.6920	0.1500	3.2538	190.0000	4121.4799 (29a)
HLR	7.0700		7.0700	0.1000	0.7070	9.0000	63.6300 (30)
Total net area of external elements A _{um} (A, m ²)			141.9763				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.0291		(33)
Main dwelling							
Party wall 1			55.3860	0.0000	0.0000	180.0000	9969.4803 (32)
Party ceiling 1			61.2600			30.0000	1837.8000 (32b)
Internal Wall 1			63.7100			75.0000	4778.2499 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		34236.6573 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							501.0487 (35)
List of Thermal Bridges							

elmhurst
energy

6. Solar gains						
[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	2.4282	11.2829	0.4000	0.8000	0.7700	6.0756 (75)
Southeast	11.1375	36.7938	0.4000	0.8000	0.7700	90.8753 (77)

Full SAP Calculation Printout



Solar gains	96.9509	167.1614	234.0778	299.0186	343.1266	344.2526	330.3951	296.9370	256.4810	186.1942	116.4924	82.7320 (83)
Total gains	532.2634	612.6486	659.6695	707.4710	728.8448	714.2877	684.8627	652.5251	624.0422	568.1074	524.4710	508.2818 (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	151.3904	151.9293	152.4720	155.2448	155.8115	158.7083	158.7083	159.3007	157.5368	155.8115	154.6822	153.5692
alpha	11.0927	11.1286	11.1648	11.3497	11.3874	11.5806	11.5806	11.6200	11.5025	11.3874	11.3121	11.2379
util living area	0.9997	0.9985	0.9918	0.9387	0.7683	0.5367	0.3850	0.4208	0.6653	0.9603	0.9985	0.9998 (86)
MIT	20.5371	20.6452	20.7759	20.9308	20.9931	20.9999	21.0000	21.0000	20.9988	20.9199	20.7030	20.5228 (87)
Th 2	20.1511	20.1538	20.1566	20.1705	20.1732	20.1871	20.1871	20.1899	20.1816	20.1732	20.1677	20.1621 (88)
util rest of house	0.9996	0.9974	0.9864	0.9074	0.7054	0.4687	0.3139	0.3467	0.5878	0.9316	0.9972	0.9997 (89)
MIT 2	19.7358	19.8459	19.9764	20.1269	20.1705	20.1871	20.1871	20.1899	20.1813	20.1238	19.9160	19.7314 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.1672	20.2762	20.4068	20.5597	20.6134	20.6247	20.6248	20.6261	20.6214	20.5524	20.3398	20.1575 (92)
Temperature adjustment	0.3000											
adjusted MIT	20.4672	20.5762	20.7068	20.8597	20.9134	20.9247	20.9248	20.9261	20.9214	20.8524	20.6398	20.4575 (93)

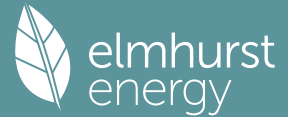
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9996	0.9980	0.9903	0.9341	0.7620	0.5304	0.3784	0.4141	0.6580	0.9561	0.9980	0.9998 (94)
Useful gains	532.0678	611.4275	653.2429	660.8545	555.3703	378.8766	259.1498	270.1992	410.6159	543.1657	523.4246	508.1657 (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	1015.6072	981.2717	886.1273	732.6437	562.3543	378.9922	259.1519	270.2048	411.7967	625.7699	832.4531	1006.7883 (97)
Space heating kWh	359.7533	248.5353	173.2660	51.6882	5.1960	0.0000	0.0000	0.0000	0.0000	61.4575	222.5005	370.9752 (98a)
Space heating requirement - total per year (kWh/year)	1493.3721											
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	359.7533	248.5353	173.2660	51.6882	5.1960	0.0000	0.0000	0.0000	0.0000	61.4575	222.5005	370.9752 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1493.3721											
Space heating per m2	(98c) / (4) = 21.8553 (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)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (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	359.7533	248.5353	173.2660	51.6882	5.1960	0.0000	0.0000	0.0000	0.0000	61.4575	222.5005	370.9752 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	359.7533	248.5353	173.2660	51.6882	5.1960	0.0000	0.0000	0.0000	0.0000	61.4575	222.5005	370.9752 (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)
Space heating fuel used, main 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)
Water heating												
Water heating requirement	227.3387	200.7312	212.4120	184.7178	177.6834	158.6077	155.4252	162.4222	165.1216	185.9258	199.9078	224.5850 (64)
Efficiency of water heater (217)m	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888	337.7888 (216)
Fuel for water heating, kWh/month	67.3020	59.4251	62.8831	54.6844	52.6019	46.9547	46.0125	48.0839	48.8831	55.0420	59.1813	66.4868 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	20.5578	18.5683	20.5578	19.8947	20.5578	19.8947	20.5578	20.5578	19.8947	20.5578	19.8947	20.5578 (231)
Lighting	20.9052	16.7710	15.1004	11.0632	8.5455	6.9818	7.7955	10.1329	13.1616	17.2688	19.5051	21.4863 (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	1493.3721 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	337.7888											
Water heating fuel used	667.5409 (219)											

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)		
mechanical ventilation fans (SFP = 0.8540)	242.0517	(230a)
Total electricity for the above, kWh/year	242.0517	(231)
Electricity for lighting (calculated in Appendix L)	168.7173	(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	2571.6819	(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	1493.3721	0.1576	235.4172	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	667.5409	0.1411	94.2132	(264)
Space and water heating			329.6304	(265)
Pumps, fans and electric keep-hot	242.0517	0.1387	33.5755	(267)
Energy for lighting	168.7173	0.1443	24.3511	(268)
Total CO2, kg/year			387.5571	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6700	(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	1493.3721	1.5836	2364.8643	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	667.5409	1.5219	1015.9149	(278)
Space and water heating			3380.7792	(279)
Pumps, fans and electric keep-hot	242.0517	1.5128	366.1757	(281)
Energy for lighting	168.7173	1.5338	258.7842	(282)
Total Primary energy kWh/year			4005.7391	(286)
Dwelling Primary energy Rate (DPER)			58.6200	(287)

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

1. Overall dwelling characteristics

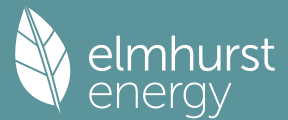
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	68.3300	3.4000	232.3220	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3300			(4)
Dwelling volume			232.3220	(5)

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) =	0.0861 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3361 (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) =	0.2605 (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
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
Adj infilt rate	0.3321	0.3256	0.3191	0.2865	0.2800	0.2474	0.2474	0.2409	0.2605	0.2800	0.2930	0.3060
Effective ac	0.5551	0.5530	0.5509	0.5410	0.5392	0.5306	0.5306	0.5290	0.5339	0.5392	0.5429	0.5468

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 Opening Type			13.5657	1.1450	15.5382			(27)					
HLF			68.3300	0.1300	8.8829			(28a)					
Wall 1	44.8800	13.5657	31.3143	0.1800	5.6366			(29a)					
Shelt wall 1	21.6920		21.6920	0.1800	3.9046			(29a)					
HLR	7.0700		7.0700	0.1100	0.7777			(30)					
Total net area of external elements Aum(A, m2)			141.9763					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	34.7399			(33)					
Main dwelling													
Party wall 1			55.3860	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							510.0140	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				6.0900	0.0500		0.3045						
E4 Jamb				17.7600	0.0500		0.8880						
E5 Ground floor (normal)				19.5800	0.1600		3.1328						
E7 Party floor between dwellings (in blocks of flats)				11.8000	0.0700		0.8260						
E14 Flat roof				7.5200	0.0800		0.6016						
E16 Corner (normal)				10.2000	0.0900		0.9180						
E17 Corner (inverted - internal area greater than external area)				3.4000	-0.0900		-0.3060						
E24 Eaves (insulation at ceiling level - inverted)				5.4600	0.2400		1.3104						
E25 Staggered party wall between dwellings				6.8000	0.0600		0.4080						
P1 Party wall - Ground floor				16.2900	0.0800		1.3032						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.5000	0.0000		0.0000						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3865	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	44.1264	(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	42.5608	42.3967	42.2357	41.4799	41.3385	40.6802	40.6802	40.5583	40.9338	41.3385	41.6246	41.9237	(38)
Average = Sum(39)m / 12 =	86.6872	86.5231	86.3621	85.6063	85.4649	84.8066	84.8066	84.6847	85.0602	85.4649	85.7510	86.0501	(39)
												85.6056	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2687	1.2663	1.2639	1.2528	1.2508	1.2411	1.2411	1.2393	1.2448	1.2508	1.2550	1.2593	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

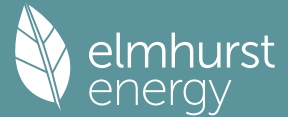
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2049	(42)
Hot water usage for mixer showers														
	61.1887	60.2691	58.9292	56.3654	54.4734	52.3635	51.1642	52.4940	53.9517	56.2172	58.8360	60.9542	(42a)	
Hot water usage for baths														
	26.4364	26.0437	25.4909	24.4714	23.7081	22.8617	22.4045	22.9535	23.5513	24.4570	25.4974	26.3470	(42b)	
Hot water usage for other uses														
	37.2105	35.8574	34.5042	33.1511	31.7980	30.4449	30.4449	31.7980	33.1511	34.5042	35.8574	37.2105	(42c)	
Average daily hot water use (litres/day)													114.7523	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	124.8355	122.1702	118.9243	113.9880	109.9795	105.6701	104.0136	107.2455	110.6542	115.1784	120.1908	124.5117	(44)	
Energy content (annual)	197.7089	173.9688	182.7822	156.0438	148.0536	129.9337	125.7954	132.7924	136.4476	156.2960	171.2338	194.9552	(45)	
Distribution loss (46)m = 0.15 x (45)m														
	29.6563	26.0953	27.4173	23.4066	22.2080	19.4901	18.8693	19.9189	20.4671	23.4444	25.6851	29.2433	(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														
	244.3038	216.0545	229.3771	201.1357	194.6485	175.0255	172.3903	179.3873	181.5395	202.8909	216.3256	241.5501	(62)	
WWHRS	-27.9729	-24.7395	-25.9057	-21.4510	-19.9915	-17.1069	-16.0350	-17.0516	-17.6995	-20.8657	-23.6383	-27.4549	(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														
	216.3309	191.3150	203.4713	179.6847	174.6570	157.9186	156.3553	162.3357	163.8400	182.0252	192.6873	214.0952	(64)	
12Total per year (kWh/year)													2194.7163	(64)
Electric shower(s)													2195	(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	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
	103.0141	91.5132	98.0510	87.9581	86.5037	79.2764	79.1029	81.4294	81.4423	89.2443	93.0087	102.0985	(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	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	110.2454	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	98.2964	108.8281	98.2964	101.5729	98.2964	101.5729	98.2964	98.2964	101.5729	98.2964	101.5729	98.2964	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	193.3684	195.3750	190.3185	179.5539	165.9655	153.1943	144.6624	142.6558	147.7123	158.4769	172.0653	184.8365	(68)
Pumps, fans	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	34.0245	(69)
	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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963	-88.1963 (71)
Water heating gains (Table 5)	138.4599	136.1804	131.7890	122.1640	116.2685	110.1061	106.3211	109.4481	113.1143	119.9521	129.1788	137.2292 (72)
Total internal gains	489.1983	499.4571	479.4775	462.3644	439.6040	420.9470	405.3535	406.4740	418.4732	435.7990	461.8906	479.4357 (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
Northeast				2.4282	11.2829	0.6300	0.7000				0.7700	8.3730 (75)
Southeast				11.1375	36.7938	0.6300	0.7000				0.7700	125.2376 (77)
Solar gains	133.6105	230.3693	322.5885	412.0850	472.8714	474.4232	455.3257	409.2163	353.4629	256.5989	160.5411	114.0150 (83)
Total gains	622.8088	729.8264	802.0660	874.4494	912.4754	895.3702	860.6792	815.6903	771.9361	692.3979	622.4317	593.4507 (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, n _{l,m} (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	111.6699	111.8817	112.0902	113.0798	113.2669	114.1461	114.1461	114.3105	113.8059	113.2669	112.8891	112.4967
alpha	8.4447	8.4588	8.4727	8.5387	8.5511	8.6097	8.6097	8.6207	8.5871	8.5511	8.5259	8.4998
util living area	0.9995	0.9980	0.9916	0.9542	0.8240	0.6030	0.4334	0.4771	0.7416	0.9712	0.9981	0.9997 (86)
MIT	20.2979	20.4343	20.6111	20.8283	20.9634	20.9975	20.9999	20.9997	20.9877	20.8156	20.5138	20.2741 (87)
Th 2	19.8655	19.8674	19.8692	19.8780	19.8796	19.8872	19.8872	19.8886	19.8843	19.8796	19.8763	19.8728 (88)
util rest of house	0.9992	0.9966	0.9856	0.9244	0.7462	0.5001	0.3239	0.3622	0.6325	0.9453	0.9965	0.9995 (89)
MIT 2	19.0717	19.2474	19.4715	19.7342	19.8597	19.8866	19.8872	19.8886	19.8802	19.7280	19.3566	19.0472 (90)
Living area fraction									f _{LA} = Living area / (4) =			0.5384 (91)
MIT	19.7319	19.8865	20.0851	20.3233	20.4539	20.4847	20.4863	20.4868	20.4765	20.3136	19.9797	19.7078 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7319	19.8865	20.0851	20.3233	20.4539	20.4847	20.4863	20.4868	20.4765	20.3136	19.9797	19.7078 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9992	0.9966	0.9870	0.9379	0.7881	0.5558	0.3829	0.4241	0.6922	0.9573	0.9967	0.9994 (94)
Useful gains	622.2855	727.3470	791.6688	820.1564	719.1320	497.6189	329.5305	345.9703	534.3227	662.8268	620.3784	593.1143 (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	1337.7506	1296.6749	1173.2363	977.9087	748.1548	499.0651	329.5829	346.0932	542.3844	830.1715	1104.4432	1334.4454 (97)
Space heating kWh	532.3061	382.5883	283.8862	113.5817	21.5929	0.0000	0.0000	0.0000	0.0000	124.5045	348.5267	551.5503 (98a)
Space heating requirement - total per year (kWh/year)												2358.5367
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	532.3061	382.5883	283.8862	113.5817	21.5929	0.0000	0.0000	0.0000	0.0000	124.5045	348.5267	551.5503 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2358.5367
Space heating per m ²										(98c) / (4) =		34.5169 (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	532.3061	382.5883	283.8862	113.5817	21.5929	0.0000	0.0000	0.0000	0.0000	124.5045	348.5267	551.5503 (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)	576.7130	414.5052	307.5691	123.0571	23.3943	0.0000	0.0000	0.0000	0.0000	134.8911	377.6020	597.5627 (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	216.3309	191.3150	203.4713	179.6847	174.6570	157.9186	156.3553	162.3357	163.8400	182.0252	192.6873	214.0952 (64)
Efficiency of water heater (217)m	85.9973	85.5824	84.8068	83.0604	80.6999	79.8000	79.8000	79.8000	79.8000	83.2261	85.3720	79.8000 (216)
Fuel for water heating, kWh/month	251.5554	223.5449	239.9235	216.3302	216.4277	197.8930	195.9340	203.4282	205.3133	218.7116	225.7031	248.7017 (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	20.4240	16.3849	14.7528	10.8085	8.3488	6.8211	7.6161	9.8997	12.8587	16.8713	19.0561	20.9917 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-7.5563	-11.7250	-18.5276	-22.9684	-26.7220	-25.6748	-25.3652	-22.9538	-19.0928	-14.2910	-8.6790	-6.4142 (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)

Full SAP Calculation Printout



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	-1.5390	-3.3762	-6.9806	-10.8986	-14.8310	-15.0582	-14.8805	-12.4026	-8.8391	-4.9574	-2.0945	-1.2069	(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												2555.2944	(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												2643.4665	(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)												164.8338	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-307.0347	(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												5142.5600	(238)

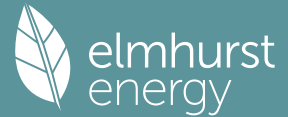
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2555.2944	0.2100	536.6118	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2643.4665	0.2100	555.1280	(264)
Space and water heating			1091.7398	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	164.8338	0.1443	23.7906	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-209.9701	0.1326	-27.8505	
PV Unit electricity exported	-97.0645	0.1248	-12.1122	
Total			-39.9626	(269)
Total CO2, kg/year			1087.4970	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9200	(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	2555.2944	1.1300	2887.4827	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2643.4665	1.1300	2987.1172	(278)
Space and water heating			5874.5998	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	164.8338	1.5338	252.8275	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-209.9701	1.4901	-312.8772	
PV Unit electricity exported	-97.0645	0.4580	-44.4547	
Total			-357.3318	(283)
Total Primary energy kWh/year			5900.1963	(286)
Target Primary Energy Rate (TPER)			86.3500	(287)

Full SAP Calculation Printout



Property Reference	Unit 3				Issued on Date	23/04/2025	
Assessment Reference	B2-2-1-2B3P			Prop Type Ref	B2-2-1-2B3P		
Property							
SAP Rating	88 B		DER	3.48		TER	12.23
Environmental	98 A		% DER < TER				71.55
CO ₂ Emissions (t/year)	0.17		DFEE	22.90		TFEE	24.16
Compliance Check	See BREL		% DFEE < TFEE				5.25
% DPER < TPER	45.29		DPER	36.44		TPER	66.61
Assessor Details	Mr. Callum MacGillivray					Assessor ID	U682-0001
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	62.7800 (1b)	2.4000 (2b)	150.6720 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.7800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	150.6720 (5)

2. Ventilation rate

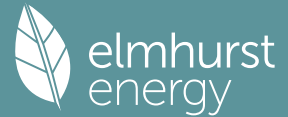
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)

	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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												71.2000 (23c)
Effective ac	0.3066	0.3034	0.3002	0.2843	0.2811	0.2651	0.2651	0.2619	0.2715	0.2811	0.2874	0.2938 (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							
Window			14.1750	1.1450	16.2366		(27)
Wall 1	37.7280	14.1750	23.5530	0.1500	3.5330	190.0000	4475.0701 (29a)
Total net area of external elements Aum(A, m ²)			37.7330				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.7696		(33)
Main dwelling							
Party wall 1			46.6560	0.0000	0.0000	180.0000	8398.0797 (32)
Party floor 1			62.7800			40.0000	2511.2000 (32d)
Party ceiling 1			62.7800			30.0000	1883.4000 (32b)
Internal Wall 1			61.1900			75.0000	4589.2499 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21856.9997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							348.1523 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.3000	0.0500	0.3150	

Full SAP Calculation Printout



E4 Jamb	18.0000	0.0500	0.9000
E7 Party floor between dwellings (in blocks of flats)	31.4400	0.0700	2.2008
E16 Corner (normal)	2.4000	0.0900	0.2160
E18 Party wall between dwellings	4.8000	0.0600	0.2880
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	38.8800	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.9198 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	23.6894 (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	15.2428	15.0843	14.9259	14.1334	13.9749	13.1825	13.1825	13.0240	13.4995	13.9749	14.2919	14.6089 (38)
Average = Sum(39)m / 12 =	38.9322	38.7737	38.6152	37.8228	37.6643	36.8719	36.8719	36.7134	37.1888	37.6643	37.9813	38.2983 (39)
												37.7832
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6201	0.6176	0.6151	0.6025	0.5999	0.5873	0.5873	0.5848	0.5924	0.5999	0.6050	0.6100 (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												2.0590 (42)
Hot water usage for mixer showers												
Hot water usage for baths	58.7430	57.8602	56.5738	54.1125	52.2961	50.2705	49.1192	50.3959	51.7953	53.9702	56.4844	58.5180 (42a)
Hot water usage for other uses	25.3847	25.0077	24.4768	23.4979	22.7649	21.9522	21.5132	22.0404	22.6144	23.4840	24.4830	25.2988 (42b)
Average daily hot water use (litres/day)	35.7167	34.4179	33.1191	31.8203	30.5215	29.2227	29.2227	30.5215	31.8203	33.1191	34.4179	35.7167 (42c)
												110.1644 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	119.8444	117.2858	114.1697	109.4307	105.5826	101.4455	99.8551	102.9577	106.2300	110.5733	115.3853	119.5335 (44)
Energy content (annual)	189.8042	167.0134	175.4746	149.8052	142.1345	124.7390	120.7661	127.4832	130.9922	150.0470	164.3875	187.1605 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1829.8075
Water storage loss:	28.4706	25.0520	26.3212	22.4708	21.3202	18.7109	18.1149	19.1225	19.6488	22.5070	24.6581	28.0741 (46)
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	219.4340	193.7758	205.1044	178.4792	171.7643	153.4130	150.3959	157.1130	159.6662	179.6768	193.0615	216.7903 (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	219.4340	193.7758	205.1044	178.4792	171.7643	153.4130	150.3959	157.1130	159.6662	179.6768	193.0615	216.7903 (64)
12Total per year (kWh/year)												2178.6745 (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	63.1099	55.5320	58.3453	49.8102	47.2597	41.4757	40.1547	42.3882	43.5549	49.8906	54.6589	62.2309 (65)

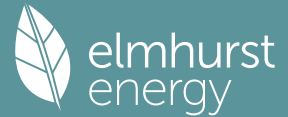
5. Internal gains (see Table 5 and 5a)

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	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	90.7388	100.4608	90.7388	93.7634	90.7388	93.7634	90.7388	90.7388	93.7634	90.7388	93.7634	90.7388 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	179.8998	181.7666	177.0623	167.0475	154.4056	142.5239	134.5863	132.7195	137.4237	147.4386	160.0805	171.9621 (68)
Pumps, fans	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618 (71)
Total internal gains	84.8251	82.6368	78.4211	69.1809	63.5211	57.6052	53.9714	56.9733	60.4929	67.0573	75.9151	83.6437 (72)
	409.3494	418.7499	400.1079	383.8774	362.5511	347.7782	333.1822	334.3173	345.5658	359.1203	383.6447	400.2302 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
North	6.0750	10.6334	0.4000	0.8000	0.7700	14.3252 (74)
Northeast	8.1000	11.2829	0.4000	0.8000	0.7700	20.2671 (75)
Solar gains	34.5923	68.6304	120.8458	196.7874	264.7372	282.6832
Total gains	443.9416	487.3803	520.9537	580.6648	627.2884	630.4614
						597.4269
						544.5901
						492.0650
						442.1240
						426.8179
						28.4933 (83)
						428.7235 (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	155.9477	156.5851	157.2278	160.5219	161.1974	164.6618	164.6618	165.3726	163.2583	161.1974	159.8521	158.5291
alpha	11.3965	11.4390	11.4819	11.7015	11.7465	11.9775	11.9775	12.0248	11.8839	11.7465	11.6568	11.5686
util living area												
	0.9959	0.9865	0.9488	0.7773	0.5581	0.3743	0.2716	0.3101	0.5214	0.8550	0.9828	0.9969 (86)
MIT	20.7073	20.7981	20.9076	20.9911	20.9998	21.0000	21.0000	21.0000	20.9999	20.9807	20.8471	20.6957 (87)
Th 2	20.4119	20.4142	20.4164	20.4278	20.4301	20.4414	20.4414	20.4437	20.4369	20.4301	20.4255	20.4210 (88)
util rest of house												
	0.9942	0.9816	0.9334	0.7442	0.5241	0.3416	0.2371	0.2726	0.4789	0.8185	0.9757	0.9957 (89)
MIT 2	20.1504	20.2409	20.3445	20.4223	20.4299	20.4414	20.4414	20.4437	20.4368	20.4183	20.2991	20.1472 (90)
Living area fraction												
									fLA = Living area / (4) =			0.4538 (91)
MIT	20.4031	20.4937	20.6000	20.6804	20.6885	20.6949	20.6949	20.6962	20.6924	20.6735	20.5478	20.3961 (92)
Temperature adjustment												0.3000
adjusted MIT	20.7031	20.7937	20.9000	20.9804	20.9885	20.9949	20.9949	20.9962	20.9924	20.9735	20.8478	20.6961 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9849	0.9464	0.7762	0.5575	0.3740	0.2712	0.3098	0.5208	0.8534	0.9811	0.9963 (94)
Useful gains	441.7711	480.0213	493.0233	450.7262	349.6836	235.7912	162.0486	168.7403	256.2666	377.3019	418.7585	427.1583 (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												
	638.6110	616.2600	556.0597	456.9156	349.8462	235.7923	162.0486	168.7404	256.3195	390.7102	522.1576	631.7719 (97)
Space heating kWh												
	146.4489	91.5524	46.8991	4.4564	0.1210	0.0000	0.0000	0.0000	0.0000	9.9757	74.4473	152.2326 (98a)
Space heating requirement - total per year (kWh/year)												526.1333
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												
	146.4489	91.5524	46.8991	4.4564	0.1210	0.0000	0.0000	0.0000	0.0000	9.9757	74.4473	152.2326 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												526.1333
Space heating per m2										(98c) / (4) =		8.3806 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	146.4489	91.5524	46.8991	4.4564	0.1210	0.0000	0.0000	0.0000	0.0000	9.9757	74.4473	152.2326 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	146.4489	91.5524	46.8991	4.4564	0.1210	0.0000	0.0000	0.0000	0.0000	9.9757	74.4473	152.2326 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	219.4340	193.7758	205.1044	178.4792	171.7643	153.4130	150.3959	157.1130	159.6662	179.6768	193.0615	216.7903 (64)
Efficiency of water heater	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383 (216)
(217)m	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383	338.0383 (217)
Fuel for water heating, kWh/month	64.9139	57.3236	60.6749	52.7985	50.8121	45.3833	44.4908	46.4779	47.2332	53.1528	57.1123	64.1319 (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	13.3327	12.0425	13.3327	12.9026	13.3327	12.9026	13.3327	13.3327	12.9026	13.3327	12.9026	13.3327 (231)
Lighting	18.8453	15.1184	13.6124	9.9731	7.7035	6.2938	7.0274	9.1344	11.8647	15.5672	17.5831	19.3691 (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												526.1333 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.0383
Water heating fuel used												644.5053 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)												
mechanical ventilation fans (SFP = 0.8540)												156.9821 (230a)
Total electricity for the above, kWh/year												156.9821 (231)
Electricity for lighting (calculated in Appendix L)												152.0924 (232)

Full SAP Calculation Printout



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	1479.7131 (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	526.1333	0.1592	83.7605 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	644.5053	0.1411	90.9521 (264)
Space and water heating			174.7126 (265)
Pumps, fans and electric keep-hot	156.9821	0.1387	21.7754 (267)
Energy for lighting	152.0924	0.1443	21.9516 (268)
Total CO2, kg/year			218.4396 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4800 (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	526.1333	1.5893	836.1633 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	644.5053	1.5218	980.8201 (278)
Space and water heating			1816.9835 (279)
Pumps, fans and electric keep-hot	156.9821	1.5128	237.4826 (281)
Energy for lighting	152.0924	1.5338	233.2844 (282)
Total Primary energy kWh/year			2287.7505 (286)
Dwelling Primary energy Rate (DPER)			36.4400 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.7800 (1b)	x 2.4000 (2b)	= 150.6720 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.7800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 150.6720 (5)

2. Ventilation rate

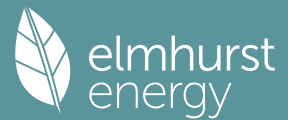
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1327 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3827 (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) = 0.3253 (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	0.4148	0.4067	0.3985	0.3579	0.3497	0.3091	0.3091	0.3009	0.3253	0.3497	0.3660	0.3823 (22b)
Effective ac	0.5860	0.5827	0.5794	0.5640	0.5612	0.5478	0.5478	0.5453	0.5529	0.5612	0.5670	0.5731 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
TER Opening Type			14.1750	1.1450	16.2366			(27)					
Wall 1	37.7280	14.1750	23.5530	0.1800	4.2395			(29a)					
Total net area of external elements Aum(A, m2)			37.7330					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	20.4762			(33)					
Main dwelling													
Party wall 1			46.6560	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							358.1523	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				6.3000	0.0500	0.3150							
E4 Jamb				18.0000	0.0500	0.9000							
E7 Party floor between dwellings (in blocks of flats)				31.4400	0.0700	2.2008							
E16 Corner (normal)				2.4000	0.0900	0.2160							
E18 Party wall between dwellings				4.8000	0.0600	0.2880							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				38.8800	0.0000	0.0000							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.9198	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	24.3960	(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	29.1383	28.9722	28.8094	28.0447	27.9016	27.2356	27.2356	27.1122	27.4921	27.9016	28.1910	28.4936	(38)
Average = Sum(39)m / 12 =	53.5343	53.3682	53.2054	52.4407	52.2976	51.6315	51.6315	51.5082	51.8881	52.2976	52.5870	52.8896	(39)
												52.4400	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8527	0.8501	0.8475	0.8353	0.8330	0.8224	0.8224	0.8205	0.8265	0.8330	0.8376	0.8425	(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													2.0590	(42)
Hot water usage for mixer showers														
58.7430	57.8602	56.5738	54.1125	52.2961	50.2705	49.1192	50.3959	51.7953	53.9702	56.4844	58.5180	58.5180	(42a)	
Hot water usage for baths														
25.3847	25.0077	24.4768	23.4979	22.7649	21.9522	21.5132	22.0404	22.6144	23.4840	24.4830	25.2988	25.2988	(42b)	
Hot water usage for other uses														
35.7167	34.4179	33.1191	31.8203	30.5215	29.2227	29.2227	30.5215	31.8203	33.1191	34.4179	35.7167	35.7167	(42c)	
Average daily hot water use (litres/day)													110.1644	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
119.8444	117.2858	114.1697	109.4307	105.5826	101.4455	99.8551	102.9577	106.2300	110.5733	115.3853	119.5335	119.5335	(44)	
Energy conte	189.8042	167.0134	175.4746	149.8052	142.1345	124.7390	120.7661	127.4832	130.9922	150.0470	164.3875	187.1605	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m														
28.4706	25.0520	26.3212	22.4708	21.3202	18.7109	18.1149	19.1225	19.6488	22.5070	24.6581	28.0741	28.0741	(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	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	23.3325	(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														
236.3991	209.0991	222.0695	194.8971	188.7294	169.8309	167.3610	174.0781	176.0841	196.6419	209.4794	233.7554	233.7554	(62)	
WWHRS	-26.8549	-23.7507	-24.8703	-20.5936	-19.1925	-16.4232	-15.3941	-16.3701	-16.9920	-20.0317	-22.6935	-26.3575	(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	209.5442	185.3485	197.1992	174.3035	169.5369	153.4077	151.9669	157.7080	159.0920	176.6101	186.7859	207.3979	(64)	
Total per year (kWh/year)													2128.9008	(64)
Electric shower(s)													2129	(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														
100.3858	89.2005	95.6212	85.8837	84.5356	77.5492	77.4307	79.6641	79.6284	87.1665	90.7323	99.5068	99.5068	(65)	

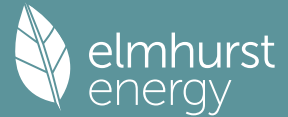
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	102.9523	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
90.7230	100.4433	90.7230	93.7471	90.7230	93.7471	90.7230	90.7230	90.7230	93.7471	90.7230	93.7471	90.7230	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
179.8998	181.7666	177.0623	167.0475	154.4056	142.5239	134.5863	132.7195	137.4237	147.4386	160.0805	171.9621	171.9621	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	33.2952	(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)														
-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	-82.3618	(71)	
Water heating gains (Table 5)														
134.9272	132.7389	128.5231	119.2829	113.6232	107.7072	104.0735	107.0754	110.5950	117.1593	126.0171	133.7457	133.7457	(72)	
Total internal gains	462.4356	471.8344	453.1941	436.9632	415.6374	397.8639	383.2684	384.4035	395.6515	412.2066	436.7304	453.3165	(73)	

6. Solar gains

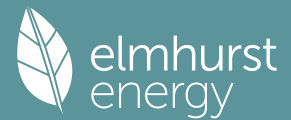
[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	------------	------------------------	--------------------	---------------------	------------------	------------

Full SAP Calculation Printout



												W/m2	or Table 6b		or Table 6c		Table 6d			
North				6.0750		10.6334				0.6300		0.7000		0.7700		19.7419 (74)				
Northeast				8.1000		11.2829				0.6300		0.7000		0.7700		27.9305 (75)				
Solar gains	47.6725	94.5813	166.5406	271.1976	364.8410	389.5728	364.1623	289.7822	201.8943	114.3895	59.4981	39.2673 (83)								
Total gains	510.1081	566.4157	619.7347	708.1608	780.4784	787.4367	747.4307	674.1857	597.5458	526.5960	496.2284	492.5838 (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	116.6688	117.0319	117.3900	119.1018	119.4277	120.9682	120.9682	121.2579	120.3702	119.4277	118.7703	118.0908								
alpha	8.7779	8.8021	8.8260	8.9401	8.9618	9.0645	9.0645	9.0839	9.0247	8.9618	8.9180	8.8727								
util living area	0.9969	0.9912	0.9678	0.8435	0.6197	0.4195	0.3039	0.3514	0.5968	0.9135	0.9896	0.9976 (86)								
MIT	20.4889	20.6050	20.7722	20.9505	20.9965	20.9999	21.0000	21.0000	20.9981	20.9165	20.6813	20.4727 (87)								
Th 2	20.2079	20.2101	20.2124	20.2228	20.2248	20.2339	20.2339	20.2356	20.2304	20.2248	20.2208	20.2167 (88)								
util rest of house	0.9955	0.9875	0.9553	0.8046	0.5696	0.3694	0.2510	0.2930	0.5315	0.8781	0.9846	0.9966 (89)								
MIT 2	19.6230	19.7714	19.9782	20.1819	20.2226	20.2339	20.2339	20.2356	20.2296	20.1550	19.8774	19.6098 (90)								
Living area fraction	fLA = Living area / (4) =												0.4538 (91)							
MIT	20.0159	20.1497	20.3385	20.5307	20.5738	20.5815	20.5816	20.5825	20.5783	20.5005	20.2422	20.0014 (92)								
Temperature adjustment													0.0000							
adjusted MIT	20.0159	20.1497	20.3385	20.5307	20.5738	20.5815	20.5816	20.5825	20.5783	20.5005	20.2422	20.0014 (93)								
8. Space heating requirement																				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
Utilisation	0.9951	0.9871	0.9576	0.8206	0.5923	0.3922	0.2750	0.3195	0.5612	0.8918	0.9847	0.9962 (94)								
Useful gains	507.6044	559.1187	593.4682	581.1339	462.2850	308.7964	205.5741	215.4286	335.3279	469.6440	488.6518	490.7165 (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	841.3397	813.8488	736.2843	609.9208	464.0781	308.8352	205.5753	215.4332	336.1484	517.7739	691.1099	835.7279 (97)								
Space heating kWh	248.2991	171.1786	106.2551	20.7266	1.3341	0.0000	0.0000	0.0000	0.0000	35.8086	145.7698	256.6885 (98a)								
Space heating requirement - total per year (kWh/year)													986.0603							
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	248.2991	171.1786	106.2551	20.7266	1.3341	0.0000	0.0000	0.0000	0.0000	35.8086	145.7698	256.6885 (98c)								
Space heating requirement after solar contribution - total per year (kWh/year)													986.0603							
Space heating per m2													(98c) / (4) =		15.7066 (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	248.2991	171.1786	106.2551	20.7266	1.3341	0.0000	0.0000	0.0000	0.0000	35.8086	145.7698	256.6885 (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)	269.0131	185.4589	115.1193	22.4557	1.4454	0.0000	0.0000	0.0000	0.0000	38.7959	157.9304	278.1023 (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	209.5442	185.3485	197.1992	174.3035	169.5369	153.4077	151.9669	157.7080	159.0920	176.6101	186.7859	207.3979 (64)								
Water heating requirement	84.4413	83.8818	82.7362	80.6689	79.8632	79.8000	79.8000	79.8000	79.8000	81.1871	83.5100	79.8000 (216)								
Efficiency of water heater	248.1536	220.9638	238.3470	216.0727	212.2841	192.2403	190.4347	197.6291	199.3634	217.5347	223.6689	245.3278 (217)								
(217)m	84.4413	83.8818	82.7362	80.6689	79.8632	79.8000	79.8000	79.8000	79.8000	81.1871	83.5100	84.5391 (217)								
Fuel for water heating, kWh/month	248.1536	220.9638	238.3470	216.0727	212.2841	192.2403	190.4347	197.6291	199.3634	217.5347	223.6689	245.3278 (219)								
Space cooling fuel requirement	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)								
(221)m	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)								
Pumps and Fa	18.8504	15.1225	13.6162	9.9758	7.7056	6.2955	7.0293	9.1369	11.8680	15.5714	17.5879	19.3744 (232)								
Lighting																				
Electricity generated by PVs (Appendix M) (negative quantity)	-6.9540	-10.7970	-17.0720	-21.1791	-24.6557	-23.6969	-23.4128	-21.1803	-17.6071	-13.1672	-7.9899	-5.9023 (233a)								
(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 (234a)								
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)								
(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 (235a)								
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	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)								
(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)	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)								
(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)	-1.4026	-3.0776	-6.3642	-9.9371	-13.5222	-13.7276	-13.5639	-11.3043	-8.0561	-4.5178	-1.9086	-1.0998 (233b)								
(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 (234b)								
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)								
(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 (235b)								
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	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)								
(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)	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)								
(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													1068.3210 (211)							
Space heating fuel - main system 2													0.0000 (213)							
Space heating fuel - secondary													0.0000 (215)							
Efficiency of water heater													79.8000							

Full SAP Calculation Printout



Water heating fuel used	2602.0202 (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)	152.1339 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-282.0962 (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	3626.3788 (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	1068.3210	0.2100	224.3474 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2602.0202	0.2100	546.4242 (264)
Space and water heating			770.7717 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	152.1339	0.1443	21.9576 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-193.6143	0.1326	-25.6782
PV Unit electricity exported	-88.4820	0.1248	-11.0413
Total			-36.7195 (269)
Total CO2, kg/year			767.9390 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.2300 (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	1068.3210	1.1300	1207.2027 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2602.0202	1.1300	2940.2828 (278)
Space and water heating			4147.4856 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	152.1339	1.5338	233.3480 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-193.6143	1.4900	-288.4946
PV Unit electricity exported	-88.4820	0.4580	-40.5243
Total			-329.0189 (283)
Total Primary energy kWh/year			4181.9154 (286)
Target Primary Energy Rate (TPER)			66.6100 (287)

Full SAP Calculation Printout



Property Reference	Unit 4			Issued on Date	23/04/2025
Assessment Reference	B1-2-1-2B3P	Prop Type Ref	B1-2-1-2B3P		
Property					
SAP Rating	91 B	DER	2.58	TER	10.91
Environmental	98 A	% DER < TER			76.35
CO ₂ Emissions (t/year)	0.14	DFEE	16.01	TFEE	16.91
Compliance Check	See BREL	% DFEE < TFEE			5.32
% DPER < TPER	53.86	DPER	27.48	TPER	59.57
Assessor Details	Mr. Callum MacGillivray			Assessor ID	U682-0001
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	62.2900 (1b)	2.4000 (2b)	149.4960 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.2900		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	149.4960 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	3	(19)

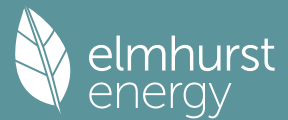
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												71.2000 (23c)
Effective ac	0.2922	0.2893	0.2864	0.2719	0.2690	0.2544	0.2544	0.2515	0.2602	0.2690	0.2748	0.2806 (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							
Window			10.1025	1.1450	11.5649		(27)
Wall 1	20.6400	10.1025	10.5375	0.1500	1.5806	190.0000	2002.1249 (29a)
Total net area of external elements Aum(A, m ²)			20.6375				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	13.1455		(33)
Main dwelling							
Party wall 1			55.8240	0.0000	0.0000	180.0000	10048.3202 (32)
Party floor 1			62.2900			40.0000	2491.6000 (32d)
Party ceiling 1			62.2900			30.0000	1868.7000 (32b)
Internal Wall 1			64.3900			75.0000	4829.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21239.9951 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							340.9856 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.4900	0.0500	0.2245	

Full SAP Calculation Printout



E4 Jamb						13.5000	0.0500	0.6750				
E7 Party floor between dwellings (in blocks of flats)						17.2000	0.0700	1.2040				
E18 Party wall between dwellings						4.8000	0.0600	0.2880				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						46.5200	0.0000	0.0000				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											2.3915	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	15.5370 (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	14.4162	14.2729	14.1295	13.4126	13.2692	12.5523	12.5523	12.4090	12.8391	13.2692	13.5560	13.8427 (38)
Average = Sum(39)m / 12 =	29.9532	29.8099	29.6665	28.9496	28.8062	28.0893	28.0893	27.9460	28.3761	28.8062	29.0930	29.3797 (39)
												28.9138
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.4809	0.4786	0.4763	0.4648	0.4625	0.4509	0.4509	0.4486	0.4555	0.4625	0.4671	0.4717 (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												2.0456 (42)
Hot water usage for mixer showers												
58.5173	57.6379	56.3565	53.9046	52.0952	50.0774	48.9305	50.2022	51.5963	53.7629	56.2674	58.2931	(42a)
Hot water usage for baths												
25.2876	24.9120	24.3832	23.4081	22.6779	21.8683	21.4309	21.9561	22.5279	23.3942	24.3894	25.2021	(42b)
Hot water usage for other uses												
35.5788	34.2851	32.9913	31.6975	30.4037	29.1100	29.1100	30.4037	31.6975	32.9913	34.2851	35.5788	(42c)
Average daily hot water use (litres/day)												109.7410 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.3838	116.8351	113.7309	109.0102	105.1769	101.0556	99.4714	102.5621	105.8217	110.1484	114.9419	119.0741 (44)
Energy content (annual)	189.0747	166.3716	174.8002	149.2295	141.5883	124.2597	120.3020	126.9933	130.4888	149.4703	163.7558	186.4413 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1822.7754
28.3612	24.9557	26.2200	22.3844	21.2382	18.6390	18.0453	19.0490	19.5733	22.4205	24.5634	27.9662	(46)
Water storage loss:												
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss												
29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder contains dedicated solar storage												
29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	(61)
Total heat required for water heating calculated for each month												
218.7045	193.1340	204.4300	177.9035	171.2181	152.9337	149.9318	156.6231	159.1628	179.1001	192.4298	216.0711	(62)
WWHRS	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	(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	(63c)
FGHRS	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												
218.7045	193.1340	204.4300	177.9035	171.2181	152.9337	149.9318	156.6231	159.1628	179.1001	192.4298	216.0711	(64)
12Total per year (kWh/year)												2171.6424 (64)
Electric shower(s)												2172 (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	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
62.8673	55.3185	58.1211	49.6188	47.0781	41.3163	40.0004	42.2253	43.3875	49.6989	54.4488	61.9917	(65)

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

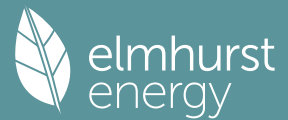
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
91.6373	101.4556	91.6373	94.6919	91.6373	94.6919	91.6373	91.6373	94.6919	91.6373	94.6919	91.6373	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
178.6832	180.5374	175.8649	165.9178	153.3614	141.5601	133.6761	131.8220	136.4944	146.4415	158.9980	170.7992	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	(71)
Water heating gains (Table 5)												
84.4991	82.3193	78.1197	68.9150	63.2770	57.3838	53.7640	56.7544	60.2604	66.7996	75.6233	83.3222	(72)
Total internal gains												
408.5034	417.9960	399.3058	383.2085	361.9595	347.3196	332.7612	333.8975	345.1306	358.5622	382.9970	399.4425	(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				5.0625	10.6334	0.4000	0.8000	0.7700	11.9377 (74)			
Northeast				5.0400	11.2829	0.4000	0.8000	0.7700	12.6106 (75)			
Solar gains	24.5483	48.4828	85.0136	138.2200	185.9751	198.6402	185.6575	147.6865	102.9627	58.5264	30.5941	20.2503 (83)
Total gains	433.0517	466.4788	484.3194	521.4285	547.9346	545.9598	518.4188	481.5839	448.0933	417.0886	413.5911	419.6928 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



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	196.9737	197.9210	198.8776	203.8024	204.8168	210.0440	210.0440	211.1216	207.9214	204.8168	202.7980	200.8187
alpha	14.1316	14.1947	14.2585	14.5868	14.6545	15.0029	15.0029	15.0748	14.8614	14.6545	14.5199	14.3879
util living area	0.9803	0.9466	0.8663	0.6711	0.4889	0.3293	0.2384	0.2669	0.4370	0.7167	0.9245	0.9842 (86)
MIT	20.8882	20.9434	20.9843	20.9995	21.0000	21.0000	21.0000	21.0000	21.0000	20.9990	20.9674	20.8810 (87)
Th 2	20.5384	20.5405	20.5426	20.5532	20.5554	20.5660	20.5660	20.5681	20.5617	20.5554	20.5511	20.5469 (88)
util rest of house	0.9743	0.9340	0.8446	0.6466	0.4655	0.3069	0.2149	0.2419	0.4092	0.6867	0.9066	0.9793 (89)
MIT 2	20.4433	20.4954	20.5315	20.5529	20.5554	20.5660	20.5660	20.5681	20.5617	20.5548	20.5269	20.4445 (90)
Living area fraction									fLA = Living area / (4) =			0.4707 (91)
MIT	20.6527	20.7062	20.7446	20.7631	20.7647	20.7703	20.7703	20.7714	20.7680	20.7639	20.7343	20.6499 (92)
Temperature adjustment												0.3000
adjusted MIT	20.9527	21.0062	21.0446	21.0631	21.0647	21.0703	21.0703	21.0714	21.0680	21.0639	21.0343	20.9499 (93)

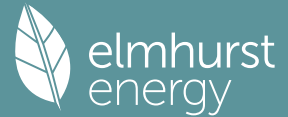
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9797	0.9468	0.8683	0.6746	0.4923	0.3329	0.2422	0.2711	0.4413	0.7210	0.9258	0.9837 (94)
Useful gains	424.2733	441.6583	420.5422	351.7445	269.7561	181.7461	125.5674	130.5472	197.7250	300.7047	382.8939	412.8491 (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	498.8026	480.1249	431.4882	352.1178	269.7603	181.7461	125.5674	130.5472	197.7256	301.4256	405.3891	492.1084 (97)
Space heating kWh	55.4498	25.8495	8.1438	0.2687	0.0031	0.0000	0.0000	0.0000	0.0000	0.5363	16.1965	58.9689 (98a)
Space heating requirement - total per year (kWh/year)												165.4168
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	55.4498	25.8495	8.1438	0.2687	0.0031	0.0000	0.0000	0.0000	0.0000	0.5363	16.1965	58.9689 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												165.4168
Space heating per m2										(98c) / (4) =		2.6556 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	55.4498	25.8495	8.1438	0.2687	0.0031	0.0000	0.0000	0.0000	0.0000	0.5363	16.1965	58.9689 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	55.4498	25.8495	8.1438	0.2687	0.0031	0.0000	0.0000	0.0000	0.0000	0.5363	16.1965	58.9689 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	218.7045	193.1340	204.4300	177.9035	171.2181	152.9337	149.9318	156.6231	159.1628	179.1001	192.4298	216.0711 (64)
Efficiency of water heater												338.0613 (216)
(217)m	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613	338.0613 (217)
Fuel for water heating, kWh/month	64.6938	57.1299	60.4713	52.6246	50.6471	45.2385	44.3505	46.3298	47.0810	52.9786	56.9216	63.9148 (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	13.2287	11.9485	13.2287	12.8019	13.2287	12.8019	13.2287	13.2287	12.8019	13.2287	12.8019	13.2287 (231)
Lighting	18.9725	15.2204	13.7043	10.0404	7.7555	6.3363	7.0748	9.1961	11.9448	15.6722	17.7017	19.4998 (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												165.4168 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.0613
Water heating fuel used												642.3813 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)												155.7569 (230a)
mechanical ventilation fans (SFP = 0.8540)												155.7569 (231)
Total electricity for the above, kWh/year												153.1188 (232)
Electricity for lighting (calculated in Appendix L)												

Full SAP Calculation Printout



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	1116.6737 (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	165.4168	0.1607	26.5896 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	642.3813	0.1411	90.6514 (264)
Space and water heating			117.2410 (265)
Pumps, fans and electric keep-hot	155.7569	0.1387	21.6054 (267)
Energy for lighting	153.1188	0.1443	22.0998 (268)
Total CO2, kg/year			160.9462 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.5800 (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	165.4168	1.5949	263.8211 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	642.3813	1.5218	977.5842 (278)
Space and water heating			1241.4054 (279)
Pumps, fans and electric keep-hot	155.7569	1.5128	235.6290 (281)
Energy for lighting	153.1188	1.5338	234.8587 (282)
Total Primary energy kWh/year			1711.8931 (286)
Dwelling Primary energy Rate (DPER)			27.4800 (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	62.2900 (1b)	x 2.4000 (2b)	= 149.4960 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.2900		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	149.4960 (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) = 0.1338 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3838 (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) = 0.2974 (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	0.3792	0.3718	0.3644	0.3272	0.3197	0.2826	0.2826	0.2751	0.2974	0.3197	0.3346	0.3495 (22b)
Effective ac	0.5719	0.5691	0.5664	0.5535	0.5511	0.5399	0.5399	0.5378	0.5442	0.5511	0.5560	0.5611 (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							

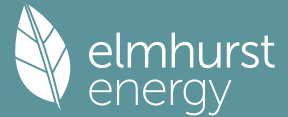
4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.0456 (42)
Hot water usage for mixer showers												
	58.5173	57.6379	56.3565	53.9046	52.0952	50.0774	48.9305	50.2022	51.5963	53.7629	56.2674	58.2931 (42a)
Hot water usage for baths												
	25.2876	24.9120	24.3832	23.4081	22.6779	21.8683	21.4309	21.9561	22.5279	23.3942	24.3894	25.2021 (42b)
Hot water usage for other uses												
	35.5788	34.2851	32.9913	31.6975	30.4037	29.1100	29.1100	30.4037	31.6975	32.9913	34.2851	35.5788 (42c)
Average daily hot water use (litres/day)												109.7410 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	119.3838	116.8351	113.7309	109.0102	105.1769	101.0556	99.4714	102.5621	105.8217	110.1484	114.9419	119.0741 (44)
Energy content (annual)												
	189.0747	166.3716	174.8002	149.2295	141.5883	124.2597	120.3020	126.9933	130.4888	149.4703	163.7558	186.4413 (45)
Distribution loss (46)m = 0.15 x (45)m												
	28.3612	24.9557	26.2200	22.3844	21.2382	18.6390	18.0453	19.0490	19.5733	22.4205	24.5634	27.9662 (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												
	235.6696	208.4573	221.3951	194.3214	188.1832	169.3515	166.8969	173.5882	175.5806	196.0652	208.8476	233.0362 (62)
WWHRS												
	-26.7517	-23.6594	-24.7748	-20.5145	-19.1188	-16.3601	-15.3350	-16.3072	-16.9268	-19.9548	-22.6063	-26.2563 (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												
	208.9180	184.7979	196.6204	173.8069	169.0644	152.9915	151.5620	157.2810	158.6539	176.1105	186.2413	206.7799 (64)
Total per year (kWh/year) = Sum(64)m =												2122.8274 (64)
12Total per year (kWh/year)												
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	100.1433	88.9871	95.3970	85.6923	84.3540	77.3898	77.2763	79.5012	79.4610	86.9748	90.5223	99.2676 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	93.7765	103.8240	93.7765	96.9024	93.7765	96.9024	93.7765	93.7765	96.9024	93.7765	96.9024	93.7765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	178.6832	180.5374	175.8649	165.9178	153.3614	141.5601	133.6761	131.8220	136.4944	146.4415	158.9980	170.7992 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279	33.2279 (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)	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234	-81.8234 (71)
Water heating gains (Table 5)	134.6012	132.4213	128.2218	119.0171	113.3791	107.4859	103.8660	106.8564	110.3625	116.9016	125.7254	133.4242 (72)
Total internal gains	463.7447	473.4665	454.5470	438.5211	417.2008	399.6322	385.0025	386.1387	397.4431	413.8035	438.3095	454.6838 (73)

[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	

Full SAP Calculation Printout



North	5.0625	10.6334	0.6300	0.7000	0.7700	16.4516 (74)
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)

Solar gains	33.8306	66.8153	117.1594	190.4844	256.2969	273.7510	255.8593	203.5304	141.8955	80.6567	42.1625	27.9074 (83)
Total gains	497.5753	540.2818	571.7064	629.0055	673.4977	673.3832	640.8618	589.6691	539.3386	494.4602	480.4720	482.5912 (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	137.8123	138.2445	138.6707	140.7083	141.0962	142.9304	142.9304	143.2754	142.2183	141.0962	140.3137	139.5048
alpha	10.1875	10.2163	10.2447	10.3806	10.4064	10.5287	10.5287	10.5517	10.4812	10.4064	10.3542	10.3003
util living area	0.9939	0.9842	0.9510	0.8070	0.5933	0.4038	0.2917	0.3307	0.5459	0.8604	0.9787	0.9953 (86)
MIT	20.6647	20.7560	20.8730	20.9797	20.9990	21.0000	21.0000	21.0000	20.9997	20.9691	20.8171	20.6508 (87)
Th 2	20.3343	20.3362	20.3381	20.3471	20.3488	20.3567	20.3567	20.3581	20.3536	20.3488	20.3454	20.3418 (88)
util rest of house	0.9915	0.9784	0.9352	0.7708	0.5522	0.3632	0.2491	0.2845	0.4950	0.8211	0.9700	0.9934 (89)
MIT 2	19.9541	20.0696	20.2108	20.3306	20.3482	20.3566	20.3567	20.3581	20.3535	20.3245	20.1538	19.9432 (90)
Living area fraction									fLA = Living area / (4) =			0.4707 (91)
MIT	20.2886	20.3927	20.5225	20.6361	20.6545	20.6595	20.6595	20.6602	20.6576	20.6279	20.4661	20.2763 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2886	20.3927	20.5225	20.6361	20.6545	20.6595	20.6595	20.6602	20.6576	20.6279	20.4661	20.2763 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9913	0.9789	0.9400	0.7872	0.5715	0.3823	0.2691	0.3062	0.5189	0.8387	0.9718	0.9931 (94)
Useful gains	493.2616	528.8958	537.3899	495.1499	384.9222	257.4566	172.4845	180.5790	279.8854	414.6958	466.9201	479.2845 (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												
Space heating	704.5745	680.5881	614.1092	506.5356	385.4180	257.4630	172.4847	180.5795	280.0253	431.6189	578.5069	699.8446 (97)
kWh	157.2168	101.9372	57.0791	8.1977	0.3689	0.0000	0.0000	0.0000	0.0000	12.5907	80.3425	164.0967 (98a)
Space heating requirement - total per year (kWh/year)												581.8297
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	157.2168	101.9372	57.0791	8.1977	0.3689	0.0000	0.0000	0.0000	0.0000	12.5907	80.3425	164.0967 (98c)
kWh												
Space heating requirement after solar contribution - total per year (kWh/year)												581.8297
Space heating per m2										(98c) / (4) =		9.3407 (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	157.2168	101.9372	57.0791	8.1977	0.3689	0.0000	0.0000	0.0000	0.0000	12.5907	80.3425	164.0967 (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)	170.3324	110.4412	61.8409	8.8816	0.3996	0.0000	0.0000	0.0000	0.0000	13.6411	87.0450	177.7862 (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 requirement	208.9180	184.7979	196.6204	173.8069	169.0644	152.9915	151.5620	157.2810	158.6539	176.1105	186.2413	206.7799 (64)
Efficiency of water heater (217)m	83.4309	82.7828	81.6621	80.1660	79.8176	79.8000	79.8000	79.8000	79.8000	80.3433	82.3143	79.8000 (216)
Fuel for water heating, kWh/month	250.4084	223.2322	240.7730	216.8088	211.8134	191.7186	189.9273	197.0940	198.8144	219.1974	226.2563	247.5027 (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	19.4849	15.6315	14.0744	10.3115	7.9649	6.5074	7.2659	9.4445	12.2674	16.0955	18.1799	20.0265 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-6.9028	-10.7188	-16.9497	-21.0284	-24.4809	-23.5292	-23.2483	-21.0325	-17.4844	-13.0738	-7.9318	-5.8588 (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	-1.3885	-3.0476	-6.3037	-9.8449	-13.3990	-13.6032	-13.4399	-11.1985	-7.9785	-4.4731	-1.8893	-1.0887 (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												630.3680 (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												2613.5465 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	157.2544 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-279.8945 (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	3207.2744 (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	630.3680	0.2100	132.3773 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2613.5465	0.2100	548.8448 (264)
Space and water heating			681.2220 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	157.2544	0.1443	22.6967 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-192.2395	0.1326	-25.4955
PV Unit electricity exported	-87.6550	0.1248	-10.9377
Total			-36.4332 (269)
Total CO2, kg/year			679.4148 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.9100 (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	630.3680	1.1300	712.3158 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2613.5465	1.1300	2953.3075 (278)
Space and water heating			3665.6234 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	157.2544	1.5338	241.2020 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-192.2395	1.4900	-286.4449
PV Unit electricity exported	-87.6550	0.4580	-40.1439
Total			-326.5888 (283)
Total Primary energy kWh/year			3710.3373 (286)
Target Primary Energy Rate (TPER)			59.5700 (287)

Full SAP Calculation Printout



Property Reference	Unit 5			Issued on Date	23/04/2025	
Assessment Reference	A2-2-4-1B1P		Prop Type Ref	A2-2-4-1B1P		
Property						
SAP Rating	91 B	DER	2.70	TER	12.44	
Environmental	98 A	% DER < TER				78.30
CO ₂ Emissions (t/year)	0.11	DFEE	13.47	TFEE	13.84	
Compliance Check	See BREL	% DFEE < TFEE				2.68
% DPER < TPER	57.67	DPER	28.89	TPER	68.24	
Assessor Details	Mr. Callum MacGillivray			Assessor ID	U682-0001	
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	43.9200 (1b)	2.4000 (2b)	105.4080 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.9200		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	105.4080 (5)

2. Ventilation rate

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

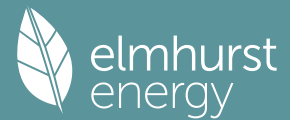
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												72.0000 (23c)
Effective ac	0.2882	0.2853	0.2824	0.2679	0.2650	0.2504	0.2504	0.2475	0.2562	0.2650	0.2708	0.2766 (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							
Window			8.1000	1.1450	9.2748		(27)
Wall 1	19.2720	8.1000	11.1720	0.1500	1.6758	190.0000	2122.6799 (29a)
Total net area of external elements Aum(A, m ²)			19.2720				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	10.9506		(33)
Main dwelling							
Party wall 1			44.6880	0.0000	0.0000	180.0000	8043.8400 (32)
Party floor 1			43.9200			40.0000	1756.8000 (32d)
Party ceiling 1			43.9200			30.0000	1317.6000 (32b)
Internal Wall 1			37.9700			75.0000	2847.7501 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16088.6699 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							366.3176 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.6000	0.0500	0.1800	

Full SAP Calculation Printout



E4 Jamb								9.0000	0.0500	0.4500		
E7 Party floor between dwellings (in blocks of flats)								16.0600	0.0700	1.1242		
E16 Corner (normal)								2.4000	0.0900	0.2160		
E17 Corner (inverted - internal area greater than external area)								2.4000	-0.0900	-0.2160		
E18 Party wall between dwellings								2.4000	0.0600	0.1440		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)								37.2400	0.0000	0.0000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											1.8982	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	12.8488 (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	10.0256	9.9245	9.8234	9.3179	9.2168	8.7114	8.7114	8.6103	8.9136	9.2168	9.4190	9.6212 (38)
Average = Sum(39)m / 12 =	22.8744	22.7733	22.6722	22.1667	22.0657	21.5602	21.5602	21.4591	21.7624	22.0657	22.2678	22.4700 (39)
												22.1415
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5208	0.5185	0.5162	0.5047	0.5024	0.4909	0.4909	0.4886	0.4955	0.5024	0.5070	0.5116 (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												1.5140 (42)
Hot water usage for mixer showers												
	49.6039	48.8584	47.7722	45.6938	44.1600	42.4495	41.4773	42.5554	43.7371	45.5736	47.6966	49.4138 (42a)
Hot water usage for baths												
	21.4545	21.1359	20.6872	19.8599	19.2404	18.5535	18.1825	18.6280	19.1131	19.8482	20.6925	21.3820 (42b)
Hot water usage for other uses												
	30.1347	29.0389	27.9431	26.8472	25.7514	24.6556	24.6556	25.7514	26.8472	27.9431	29.0389	30.1347 (42c)
Average daily hot water use (litres/day)												93.0200 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	101.1931	99.0332	96.4024	92.4009	89.1518	85.6587	84.3154	86.9348	89.6975	93.3648	97.4280	100.9305 (44)
Energy conte	160.2651	141.0220	148.1669	126.4923	120.0155	105.3273	101.9722	107.6435	110.6060	126.6952	138.8041	158.0328 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												1545.0428
	24.0398	21.1533	22.2250	18.9738	18.0023	15.7991	15.2958	16.1465	16.5909	19.0043	20.8206	23.7049 (46)
Water storage loss:												
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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												
	189.8949	167.7844	177.7967	155.1663	149.6453	134.0013	131.6020	137.2733	139.2800	156.3250	167.4781	187.6626 (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	189.8949	167.7844	177.7967	155.1663	149.6453	134.0013	131.6020	137.2733	139.2800	156.3250	167.4781	187.6626 (64)
12Total per year (kWh/year)												1893.9098 (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	53.2882	46.8898	49.2655	42.0587	39.9052	35.0213	33.9057	35.7914	36.7765	42.1262	46.1524	52.5459 (65)

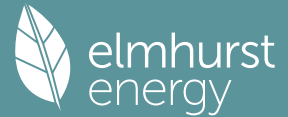
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	66.4932	73.6175	66.4932	68.7096	66.4932	68.7096	66.4932	66.4932	68.7096	66.4932	68.7096	66.4932 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	131.5028	132.8674	129.4287	122.1081	112.8671	104.1819	98.3796	97.0150	100.4538	107.7744	117.0154	125.7006 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699 (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)												
	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592 (71)
Water heating gains (Table 5)												
	71.6239	69.7765	66.2171	58.4148	53.6360	48.6407	45.5722	48.1068	51.0785	56.6212	64.1005	70.6262 (72)
Total internal gains	315.3296	321.9711	307.8487	294.9422	278.7060	267.2420	256.1548	257.3247	265.9515	276.5984	295.5352	308.5297 (73)

6. Solar gains												

[Jan]												
			Area	Solar flux								Gains
			m2	Table 6a	g							W
				W/m2	Specific data							
					or Table 6b							
						Specific data						
						or Table 6c						
							Access					
							factor					
							Table 6d					
Southwest			8.1000	36.7938	0.4000	0.8000			0.7700			66.0911 (79)
Solar gains	66.0911	112.5777	154.0337	190.8552	213.7737	212.2278	204.6103	187.5120	166.7859	124.4223	79.1620	56.5602 (83)
Total gains	381.4207	434.5487	461.8823	485.7974	492.4797	479.4698	460.7650	444.8367	432.7374	401.0208	374.6971	365.0899 (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	195.3746	196.2419	197.1169	201.6117	202.5354	207.2837	207.2837	208.2602	205.3579	202.5354	200.6964	198.8905
alpha	14.0250	14.0828	14.1411	14.4408	14.5024	14.8189	14.8189	14.8840	14.6905	14.5024	14.3798	14.2594
util living area	0.9342	0.8307	0.7101	0.5521	0.4167	0.2878	0.2059	0.2219	0.3470	0.5722	0.8163	0.9489 (86)
MIT	20.9500	20.9889	20.9985	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9999	20.9929	20.9394 (87)
Th 2	20.5018	20.5039	20.5060	20.5165	20.5186	20.5292	20.5292	20.5313	20.5250	20.5186	20.5144	20.5102 (88)
util rest of house	0.9192	0.8085	0.6864	0.5300	0.3951	0.2666	0.1839	0.1993	0.3231	0.5457	0.7908	0.9362 (89)
MIT 2	20.4628	20.4961	20.5050	20.5165	20.5186	20.5292	20.5292	20.5313	20.5250	20.5186	20.5097	20.4621 (90)
Living area fraction									fLA = Living area / (4) =			0.6214 (91)
MIT	20.7655	20.8023	20.8116	20.8169	20.8177	20.8217	20.8217	20.8225	20.8201	20.8177	20.8099	20.7587 (92)
Temperature adjustment												0.3000
adjusted MIT	21.0655	21.1023	21.1116	21.1169	21.1177	21.1217	21.1217	21.1225	21.1201	21.1177	21.1099	21.0587 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9360	0.8351	0.7154	0.5574	0.4220	0.2933	0.2116	0.2278	0.3530	0.5786	0.8220	0.9503 (94)
Useful gains	356.9916	362.9022	330.4204	270.7829	207.8079	140.6097	97.4893	101.3412	152.7747	232.0444	307.9855	346.9391 (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	383.5008	368.9806	331.2781	270.8088	207.8084	140.6097	97.4893	101.3412	152.7747	232.0796	311.9712	378.8150 (97)
Space heating kWh	19.7228	4.0847	0.6382	0.0187	0.0003	0.0000	0.0000	0.0000	0.0000	0.0261	2.8697	23.7156 (98a)
Space heating requirement - total per year (kWh/year)												51.0760
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	19.7228	4.0847	0.6382	0.0187	0.0003	0.0000	0.0000	0.0000	0.0000	0.0261	2.8697	23.7156 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												51.0760
Space heating per m2										(98c) / (4) =		1.1629 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	19.7228	4.0847	0.6382	0.0187	0.0003	0.0000	0.0000	0.0000	0.0000	0.0261	2.8697	23.7156 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	19.7228	4.0847	0.6382	0.0187	0.0003	0.0000	0.0000	0.0000	0.0000	0.0261	2.8697	23.7156 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	189.8949	167.7844	177.7967	155.1663	149.6453	134.0013	131.6020	137.2733	139.2800	156.3250	167.4781	187.6626 (64)
Efficiency of water heater												338.5800 (216)
(217)m	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800 (217)
Fuel for water heating, kWh/month	56.0857	49.5553	52.5125	45.8285	44.1979	39.5774	38.8688	40.5438	41.1365	46.1708	49.4648	55.4264 (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	9.6332	8.7010	9.6332	9.3225	9.6332	9.3225	9.6332	9.6332	9.3225	9.6332	9.3225	9.6332 (231)
Lighting	13.2826	10.6558	9.5943	7.0292	5.4296	4.4360	4.9530	6.4381	8.3625	10.9721	12.3929	13.6517 (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												51.0760 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.5800
Water heating fuel used												559.3685 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)												
mechanical ventilation fans (SFP = 0.8820)												113.4232 (230a)
Total electricity for the above, kWh/year												113.4232 (231)
Electricity for lighting (calculated in Appendix L)												107.1979 (232)

Full SAP Calculation Printout



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	831.0657 (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	51.0760	0.1619	8.2712 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	559.3685	0.1411	78.8990 (264)
Space and water heating			87.1703 (265)
Pumps, fans and electric keep-hot	113.4232	0.1387	15.7332 (267)
Energy for lighting	107.1979	0.1443	15.4720 (268)
Total CO2, kg/year			118.3754 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.7000 (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	51.0760	1.5992	81.6826 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	559.3685	1.5216	851.1127 (278)
Space and water heating			932.7952 (279)
Pumps, fans and electric keep-hot	113.4232	1.5128	171.5867 (281)
Energy for lighting	107.1979	1.5338	164.4237 (282)
Total Primary energy kWh/year			1268.8056 (286)
Dwelling Primary energy Rate (DPER)			28.8900 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	43.9200	2.4000	105.4080
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.9200		105.4080
Dwelling volume			105.4080

2. Ventilation rate

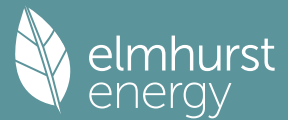
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1897 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4397 (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) = 0.3408 (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	0.4345	0.4260	0.4175	0.3749	0.3664	0.3238	0.3238	0.3152	0.3408	0.3664	0.3834	0.4004 (22b)
Effective ac	0.5944	0.5907	0.5871	0.5703	0.5671	0.5524	0.5524	0.5497	0.5581	0.5671	0.5735	0.5802 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opening Type			8.1000	1.1450	9.2748		(27)
Wall 1	19.2720	8.1000	11.1720	0.1800	2.0110		(29a)
Total net area of external elements Aum(A, m2)			19.2720				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		11.2858		(33)
Main dwelling							
Party wall 1			44.6880	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 376.3176 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	3.6000	0.0500	0.1800
E2 Other lintels (including other steel lintels)	9.0000	0.0500	0.4500
E4 Jamb	16.0600	0.0700	1.1242
E7 Party floor between dwellings (in blocks of flats)	2.4000	0.0900	0.2160
E16 Corner (normal)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)	2.4000	0.0600	0.1440
E18 Party wall between dwellings	37.2400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			1.8982 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 13.1840 (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	20.6761	20.5486	20.4236	19.8365	19.7267	19.2154	19.2154	19.1207	19.4123	19.7267	19.9489	20.1812
Average = Sum(39)m / 12 =	33.8600	33.7325	33.6075	33.0205	32.9106	32.3993	32.3993	32.3046	32.5963	32.9106	33.1328	33.3651
	33.8600	33.7325	33.6075	33.0205	32.9106	32.3993	32.3993	32.3046	32.5963	32.9106	33.1328	33.3651
HLP	0.7709	0.7680	0.7652	0.7518	0.7493	0.7377	0.7377	0.7355	0.7422	0.7493	0.7544	0.7597
HLP (average)												0.7518
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.5140 (42)
Hot water usage for mixer showers													
Hot water usage for baths	49.6039	48.8584	47.7722	45.6938	44.1600	42.4495	41.4773	42.5554	43.7371	45.5736	47.6966	49.4138	(42a)
Hot water usage for other uses	21.4545	21.1359	20.6872	19.8599	19.2404	18.5535	18.1825	18.6280	19.1131	19.8482	20.6925	21.3820	(42b)
Average daily hot water use (litres/day)	30.1347	29.0389	27.9431	26.8472	25.7514	24.6556	24.6556	25.7514	26.8472	27.9431	29.0389	30.1347	(42c)
	30.1347	29.0389	27.9431	26.8472	25.7514	24.6556	24.6556	25.7514	26.8472	27.9431	29.0389	30.1347	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	101.1931	99.0332	96.4024	92.4009	89.1518	85.6587	84.3154	86.9348	89.6975	93.3648	97.4280	100.9305	(44)
Energy content (annual)	160.2651	141.0220	148.1669	126.4923	120.0155	105.3273	101.9722	107.6435	110.6060	126.6952	138.8041	158.0328	(45)
Distribution loss (46)m = 0.15 x (45)m	24.0398	21.1533	22.2250	18.9738	18.0023	15.7991	15.2958	16.1465	16.5909	19.0043	20.8206	23.7049	(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													
Primary 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	(57)
Combi 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)
Total heat required for water heating calculated for each month	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)
WWHRS	206.8600	183.1077	194.7618	171.5841	166.6104	150.4192	148.5671	154.2384	155.6978	173.2901	183.8959	204.6277	(62)
PV diverter	-22.6768	-20.0556	-21.0010	-17.3897	-16.2066	-13.8681	-12.9991	-13.8232	-14.3484	-16.9152	-19.1629	-22.2569	(63a)
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	(63b)
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	(63c)
Output from w/h	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)
12Total per year (kWh/year)	184.1832	163.0521	173.7608	154.1944	150.4039	136.5511	135.5680	140.4151	141.3494	156.3749	164.7330	182.3708	(64)
Electric shower(s)													
Heat gains from water heating, kWh/month	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)
	90.5641	80.5584	86.5414	78.1321	77.1811	71.0948	71.1817	73.0674	72.8500	79.4021	82.2258	89.8218	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

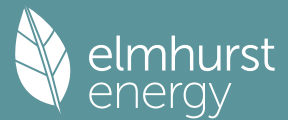
5. Internal gains (see Table 5 and 5a)

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	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	75.6990	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	67.4910	74.7222	67.4910	69.7407	67.4910	69.7407	67.4910	67.4910	69.7407	67.4910	69.7407	67.4910	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	131.5028	132.8674	129.4287	122.1081	112.8671	104.1819	98.3796	97.0150	100.4538	107.7744	117.0154	125.7006	(68)
Pumps, fans	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	30.5699	(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)	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	-60.5592	(71)
Total internal gains	121.7259	119.8785	116.3191	108.5169	103.7380	98.7428	95.6743	98.2088	101.1805	106.7232	114.2025	120.7283	(72)
	369.4294	376.1778	361.9485	349.0753	332.8058	318.3750	307.2546	308.4245	317.0846	330.6983	349.6683	362.6295	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



		m2				Table 6a	Specific data		Specific data		factor		W
						W/m2	or Table 6b		or Table 6c		Table 6d		
Southwest		8.1000				36.7938	0.6300		0.7000		0.7700		91.0819 (79)
Solar gains	91.0819	155.1461	212.2777	263.0223	294.6069	292.4765	281.9785	258.4150	229.8518	171.4695	109.0951	77.9471 (83)	
Total gains	460.5112	531.3239	574.2261	612.0976	627.4127	610.8515	589.2331	566.8395	546.9364	502.1678	458.7633	440.5766 (84)	

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)													
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	135.5897	136.1023	136.6085	139.0372	139.5012	141.7027	141.7027	142.1181	140.8466	139.5012	138.5657	137.6009	
alpha	10.0393	10.0735	10.1072	10.2691	10.3001	10.4468	10.4468	10.4745	10.3898	10.3001	10.2377	10.1734	
util living area	0.9736	0.9193	0.8195	0.6499	0.4877	0.3395	0.2419	0.2622	0.4112	0.6773	0.9128	0.9802 (86)	
MIT	20.7852	20.8997	20.9693	20.9968	20.9998	21.0000	21.0000	21.0000	21.0000	20.9961	20.9231	20.7635 (87)	
Th 2	20.2786	20.2811	20.2836	20.2953	20.2975	20.3077	20.3077	20.3096	20.3037	20.2975	20.2930	20.2884 (88)	
util rest of house	0.9645	0.8985	0.7871	0.6131	0.4509	0.3027	0.2039	0.2228	0.3697	0.6334	0.8874	0.9730 (89)	
MIT 2	20.0505	20.1835	20.2571	20.2929	20.2974	20.3077	20.3077	20.3096	20.3037	20.2949	20.2222	20.0335 (90)	
Living area fraction	fLA = Living area / (4) = 0.6214 (91)												
MIT	20.5070	20.6285	20.6996	20.7303	20.7338	20.7378	20.7378	20.7386	20.7363	20.7306	20.6577	20.4871 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.5070	20.6285	20.6996	20.7303	20.7338	20.7378	20.7378	20.7386	20.7363	20.7306	20.6577	20.4871 (93)	

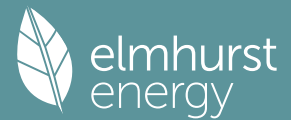
8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9677	0.9090	0.8062	0.6359	0.4738	0.3255	0.2275	0.2473	0.3955	0.6606	0.9011	0.9752 (94)	
Useful gains	445.6243	482.9953	462.9695	389.2287	297.2381	198.8611	134.0636	140.1558	216.3116	331.7383	413.3999	429.6645 (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	548.7700	530.5633	477.2137	390.6415	297.3095	198.8622	134.0636	140.1558	216.3201	333.4037	449.2067	543.4223 (97)	
Space heating kWh	76.7404	31.9657	10.5977	1.0172	0.0531	0.0000	0.0000	0.0000	0.0000	1.2390	25.7809	84.6358 (98a)	
Space heating requirement - total per year (kWh/year)	232.0298												
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	76.7404	31.9657	10.5977	1.0172	0.0531	0.0000	0.0000	0.0000	0.0000	1.2390	25.7809	84.6358 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	232.0298												
Space heating per m2	(98c) / (4) = 5.2830 (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	76.7404	31.9657	10.5977	1.0172	0.0531	0.0000	0.0000	0.0000	0.0000	1.2390	25.7809	84.6358 (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)	83.1424	34.6324	11.4818	1.1021	0.0575	0.0000	0.0000	0.0000	0.0000	1.3424	27.9316	91.6964 (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	184.1832	163.0521	173.7608	154.1944	150.4039	136.5511	135.5680	140.4151	141.3494	156.3749	164.7330	182.3708 (64)	
Water heating requirement	82.2518	81.1481	80.2676	79.8530	79.8029	79.8000	79.8000	79.8000	79.8000	79.8636	80.9097	79.8000 (216)	
Efficiency of water heater	82.2518	81.1481	80.2676	79.8530	79.8029	79.8000	79.8000	79.8000	79.8000	79.8636	80.9097	82.4488 (217)	
Fuel for water heating, kWh/month	223.9260	200.9315	216.4768	193.0977	188.4693	171.1167	169.8847	175.9588	177.1295	195.8024	203.6011	221.1928 (219)	
Space cooling fuel requirement	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)	
(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	14.0233	11.2500	10.1294	7.4212	5.7324	4.6834	5.2293	6.7972	8.8289	11.5840	13.0840	14.4130 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-4.8981	-7.6237	-12.0855	-15.0359	-17.5482	-16.8883	-16.6923	-15.0829	-12.5086	-9.3200	-5.6359	-4.1558 (233a)	
(233a)m	-4.8981	-7.6237	-12.0855	-15.0359	-17.5482	-16.8883	-16.6923	-15.0829	-12.5086	-9.3200	-5.6359	-4.1558 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	
(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)	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)	
(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)	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)	
(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)	-0.9480	-2.0828	-4.3102	-6.7326	-9.1606	-9.2933	-9.1761	-7.6429	-5.4450	-3.0522	-1.2890	-0.7428 (233b)	
(233b)m	-0.9480	-2.0828	-4.3102	-6.7326	-9.1606	-9.2933	-9.1761	-7.6429	-5.4450	-3.0522	-1.2890	-0.7428 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	
(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)	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)	
(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)	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)	
(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	251.3866 (211)												
Space heating fuel - main system 2	0.0000 (213)												
Space heating fuel - secondary	0.0000 (215)												
Efficiency of water heater	79.8000												

Full SAP Calculation Printout



Water heating fuel used	2337.5872 (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)	113.1760 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-197.3505 (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	2590.7992 (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	251.3866	0.2100	52.7912 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2337.5872	0.2100	490.8933 (264)
Space and water heating			543.6845 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	113.1760	0.1443	16.3348 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.4751	0.1326	-18.2245
PV Unit electricity exported	-59.8754	0.1248	-7.4720
Total			-25.6965 (269)
Total CO2, kg/year			546.2521 (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	251.3866	1.1300	284.0668 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.5872	1.1300	2641.4736 (278)
Space and water heating			2925.5404 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	113.1760	1.5338	173.5931 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.4751	1.4898	-204.8135
PV Unit electricity exported	-59.8754	0.4580	-27.4243
Total			-232.2378 (283)
Total Primary energy kWh/year			2996.9964 (286)
Target Primary Energy Rate (TPER)			68.2400 (287)

Full SAP Calculation Printout



Property Reference	Unit 6			Issued on Date	23/04/2025
Assessment Reference	A1-2-9-1B1P	Prop Type Ref	A1-2-9-1B1P		
Property					
SAP Rating	91 B	DER	2.85	TER	13.05
Environmental	98 A	% DER < TER			78.16
CO ₂ Emissions (t/year)	0.11	DFEE	16.51	TFEE	17.68
Compliance Check	See BREL	% DFEE < TFEE			6.61
% DPER < TPER	57.48	DPER	30.41	TPER	71.53
Assessor Details	Mr. Callum MacGillivray			Assessor ID	U682-0001
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	44.0000 (1b)	2.4000 (2b)	105.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	105.6000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	3	(19)

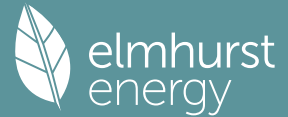
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												72.0000 (23c)
Effective ac	0.2882	0.2853	0.2824	0.2679	0.2650	0.2504	0.2504	0.2475	0.2562	0.2650	0.2708	0.2766 (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							
Window			8.1000	1.1450	9.2748		(27)
Wall 1	15.0000	8.1000	6.9000	0.1500	1.0350	190.0000	1311.0000 (29a)
Total net area of external elements Aum(A, m ²)			15.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	10.3098		(33)
Main dwelling							
Party wall 1			49.1040	0.0000	0.0000	180.0000	8838.7200 (32)
Party floor 1			44.0000			40.0000	1760.0000 (32d)
Party ceiling 1			44.0000			30.0000	1320.0000 (32b)
Internal Wall 1			37.9100			75.0000	2843.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16072.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							365.2948 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.6000	0.0500	0.1800	

Full SAP Calculation Printout



E4 Jamb									9.0000	0.0500	0.4500	
E7 Party floor between dwellings (in blocks of flats)									12.5000	0.0700	0.8750	
E18 Party wall between dwellings									4.8000	0.0600	0.2880	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									40.9200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												1.7930 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss										(33) + (36) + (36a) =		12.1028 (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
	10.0438	9.9426	9.8413	9.3349	9.2336	8.7272	8.7272	8.6260	8.9298	9.2336	9.4362	9.6387 (38)
Heat transfer coeff	22.1467	22.0454	21.9441	21.4377	21.3364	20.8301	20.8301	20.7288	21.0326	21.3364	21.5390	21.7415 (39)
Average = Sum(39)m / 12 =												21.4124
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5033	0.5010	0.4987	0.4872	0.4849	0.4734	0.4734	0.4711	0.4780	0.4849	0.4895	0.4941 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	0.4866
												31

4. Water heating energy requirements (kWh/year)													
Assumed occupancy												1.5162 (42)	
Hot water usage for mixer showers	49.6418	48.8958	47.8087	45.7287	44.1937	42.4820	41.5090	42.5879	43.7705	45.6084	47.7331	49.4516 (42a)	
Hot water usage for baths	21.4708	21.1519	20.7029	19.8750	19.2550	18.5676	18.1963	18.6422	19.1277	19.8632	20.7082	21.3982 (42b)	
Hot water usage for other uses	30.1578	29.0612	27.9645	26.8679	25.7712	24.6746	24.6746	25.7712	26.8679	27.9645	29.0612	30.1578 (42c)	
Average daily hot water use (litres/day)												93.0911 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	101.2704	99.1089	96.4761	92.4715	89.2200	85.7241	84.3798	87.0012	89.7660	93.4362	97.5024	101.0076 (44)	
Energy content (annual)	160.3876	141.1297	148.2801	126.5889	120.1072	105.4078	102.0501	107.7257	110.6905	126.7920	138.9101	158.1535 (45)	
Distribution loss (46)m = 0.15 x (45)m	24.0581	21.1695	22.2420	18.9883	18.0161	15.8112	15.3075	16.1589	16.6036	19.0188	20.8365	23.7230 (46)	
Water storage loss:													
Store volume												269.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.9558 (55)	
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)	
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	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													
	190.0174	167.8921	177.9099	155.2629	149.7370	134.0818	131.6799	137.3555	139.3645	156.4218	167.5841	187.7833 (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	190.0174	167.8921	177.9099	155.2629	149.7370	134.0818	131.6799	137.3555	139.3645	156.4218	167.5841	187.7833 (64)	
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			1895.0901 (64)
Electric shower(s)												1895 (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 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
	53.3289	46.9256	49.3031	42.0908	39.9356	35.0481	33.9316	35.8188	36.8046	42.1583	46.1876	52.5860 (65)	

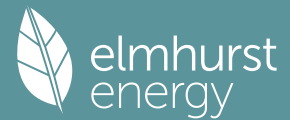
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	66.6053	73.7416	66.6053	68.8255	66.6053	68.8255	66.6053	66.6053	68.8255	66.6053	68.8255	66.6053 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812 (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)												
	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)												
	71.6786	69.8298	66.2677	58.4595	53.6769	48.6779	45.6071	48.1435	51.1175	56.6644	64.1495	70.6802 (72)
Total internal gains												
	315.7357	322.3899	308.2474	295.3273	279.0692	267.5916	256.4892	257.6590	266.2972	276.9561	295.9167	308.9260 (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			
Northwest				8.1000	11.2829	0.4000		0.8000	0.7700		20.2671 (81)	
Solar gains	20.2671	41.2542	74.3269	122.0661	164.0808	174.9275	163.6411	130.4566	90.5685	50.4159	25.5012	16.5511 (83)
Total gains	336.0027	363.6441	382.5743	417.3934	443.1500	442.5191	420.1303	388.1156	356.8657	327.3719	321.4179	325.4771 (84)

7. Mean internal temperature (heating season)											
---	--	--	--	--	--	--	--	--	--	--	--

Full SAP Calculation Printout



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	201.5976	202.5238	203.4585	208.2644	209.2530	214.3400	214.3400	215.3872	212.2758	209.2530	207.2852	205.3540	
alpha	14.4398	14.5016	14.5639	14.8843	14.9502	15.2893	15.2893	15.3591	15.1517	14.9502	14.8190	14.6903	
util living area	0.9704	0.9235	0.8216	0.6213	0.4478	0.3013	0.2182	0.2457	0.4067	0.6772	0.8984	0.9761 (86)	
MIT	20.9144	20.9627	20.9924	20.9998	21.0000	21.0000	21.0000	21.0000	21.0000	20.9996	20.9792	20.9069 (87)	
Th 2	20.5178	20.5199	20.5220	20.5326	20.5347	20.5453	20.5453	20.5474	20.5410	20.5347	20.5304	20.5262 (88)	
util rest of house	0.9617	0.9070	0.7975	0.5973	0.4254	0.2799	0.1956	0.2215	0.3796	0.6471	0.8767	0.9687 (89)	
MIT 2	20.4474	20.4915	20.5169	20.5325	20.5347	20.5453	20.5453	20.5474	20.5410	20.5345	20.5158	20.4486 (90)	
Living area fraction									fLA = Living area / (4) =				0.6180 (91)
MIT	20.7360	20.7827	20.8107	20.8213	20.8222	20.8263	20.8263	20.8271	20.8247	20.8219	20.8022	20.7318 (92)	
Temperature adjustment												0.3000	
adjusted MIT	21.0360	21.0827	21.1107	21.1213	21.1222	21.1263	21.1263	21.1271	21.1247	21.1219	21.1022	21.0318 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9710	0.9262	0.8270	0.6275	0.4537	0.3072	0.2244	0.2525	0.4140	0.6850	0.9028	0.9765 (94)
Useful gains	326.2435	336.7930	316.3869	261.9011	201.0359	135.9426	94.2825	97.9866	147.7466	224.2481	290.1836	317.8263 (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	370.6459	356.7530	320.6197	261.9964	201.0367	135.9426	94.2825	97.9866	147.7468	224.4995	301.5925	365.9501 (97)
Space heating kWh	33.0354	13.4132	3.1492	0.0686	0.0006	0.0000	0.0000	0.0000	0.0000	0.1870	8.2144	35.8041 (98a)
Space heating requirement - total per year (kWh/year)												93.8725
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	33.0354	13.4132	3.1492	0.0686	0.0006	0.0000	0.0000	0.0000	0.0000	0.1870	8.2144	35.8041 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												93.8725
Space heating per m2										(98c) / (4) =		2.1335 (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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (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	33.0354	13.4132	3.1492	0.0686	0.0006	0.0000	0.0000	0.0000	0.0000	0.1870	8.2144	35.8041 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	33.0354	13.4132	3.1492	0.0686	0.0006	0.0000	0.0000	0.0000	0.0000	0.1870	8.2144	35.8041 (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)	
Space heating fuel used, main system 2												0.0000 (213)	
Water heating													
Water heating requirement	190.0174	167.8921	177.9099	155.2629	149.7370	134.0818	131.6799	137.3555	139.3645	156.4218	167.5841	187.7833 (64)	
Efficiency of water heater												338.5800 (216)	
(217)m	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800 (217)	
Fuel for water heating, kWh/month	56.1218	49.5871	52.5459	45.8571	44.2250	39.6012	38.8918	40.5681	41.1615	46.1994	49.4962	55.4620 (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	9.6508	8.7168	9.6508	9.3394	9.6508	9.3394	9.6508	9.6508	9.3394	9.6508	9.3394	9.6508 (231)	
Lighting	13.3050	10.6737	9.6105	7.0411	5.4387	4.4435	4.9614	6.4490	8.3766	10.9906	12.4138	13.6747 (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													93.8725 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													338.5800
Water heating fuel used													559.7171 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)													
mechanical ventilation fans (SFP = 0.8820)													113.6298 (230a)
Total electricity for the above, kWh/year													113.6298 (231)
Electricity for lighting (calculated in Appendix L)													107.3787 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													

Full SAP Calculation Printout



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	874.5980 (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	93.8725	0.1611	15.1245 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	559.7171	0.1411	78.9484 (264)
Space and water heating			94.0729 (265)
Pumps, fans and electric keep-hot	113.6298	0.1387	15.7619 (267)
Energy for lighting	107.3787	0.1443	15.4981 (268)
Total CO2, kg/year			125.3328 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.8500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	93.8725	1.5962	149.8427 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	559.7171	1.5216	851.6438 (278)
Space and water heating			1001.4865 (279)
Pumps, fans and electric keep-hot	113.6298	1.5128	171.8992 (281)
Energy for lighting	107.3787	1.5338	164.7010 (282)
Total Primary energy kWh/year			1338.0867 (286)
Dwelling Primary energy Rate (DPER)			30.4100 (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	44.0000 (1b)	x 2.4000 (2b)	= 105.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 105.6000 (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)

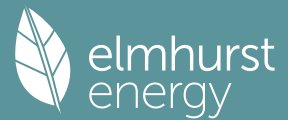
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1894 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.4394		(18)
Number of sides sheltered	3		(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3405 (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	0.4342	0.4257	0.4171	0.3746	0.3661	0.3235	0.3235	0.3150	0.3405	0.3661	0.3831	0.4001 (22b)
Effective ac	0.5943	0.5906	0.5870	0.5702	0.5670	0.5523	0.5523	0.5496	0.5580	0.5670	0.5734	0.5800 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			8.1000	1.1450	9.2748		(27)

Full SAP Calculation Printout



Wall 1	15.0000	8.1000	6.9000	0.1800	1.2420	(29a)
Total net area of external elements Aum(A, m2)			15.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.5168	(33)
Main dwelling						
Party wall 1			49.1040	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						375.2948 (35)
List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)			3.6000	0.0500	0.1800	
E4 Jamb			9.0000	0.0500	0.4500	
E7 Party floor between dwellings (in blocks of flats)			12.5000	0.0700	0.8750	
E18 Party wall between dwellings			4.8000	0.0600	0.2880	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)			40.9200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					1.7930 (36)	
Point Thermal bridges					(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =	12.3098 (37)

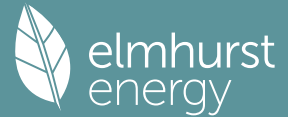
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	20.7086	20.5810	20.4560	19.8688	19.7589	19.2475	19.2475	19.1528	19.4445	19.7589	19.9812	20.2136	(38)
Average = Sum(39)m / 12 =	33.0184	32.8908	32.7658	32.1786	32.0688	31.5573	31.5573	31.4626	31.7543	32.0688	32.2910	32.5234	(39)
												32.1781	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.7504	0.7475	0.7447	0.7313	0.7288	0.7172	0.7172	0.7151	0.7217	0.7288	0.7339	0.7392	(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													1.5162 (42)
Hot water usage for mixer showers													
Hot water usage for baths	49.6418	48.8958	47.8087	45.7287	44.1937	42.4820	41.5090	42.5879	43.7705	45.6084	47.7331	49.4516	(42a)
Hot water usage for other uses	21.4708	21.1519	20.7029	19.8750	19.2550	18.5676	18.1963	18.6422	19.1277	19.8632	20.7082	21.3982	(42b)
Average daily hot water use (litres/day)	30.1578	29.0612	27.9645	26.8679	25.7712	24.6746	24.6746	25.7712	26.8679	27.9645	29.0612	30.1578	(42c)
												93.0911	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	101.2704	99.1089	96.4761	92.4715	89.2200	85.7241	84.3798	87.0012	89.7660	93.4362	97.5024	101.0076	(44)
Energy content (annual)	160.3876	141.1297	148.2801	126.5889	120.1072	105.4078	102.0501	107.7257	110.6905	126.7920	138.9101	158.1535	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	24.0581	21.1695	22.2420	18.9883	18.0161	15.8112	15.3075	16.1589	16.6036	19.0188	20.8365	23.7230	(46)
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													
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	(56)
Primary 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	(57)
Combi 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)
Total heat required for water heating calculated for each month	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)
WWHRS	206.9825	183.2154	194.8750	171.6807	166.7021	150.4996	148.6450	154.3206	155.7823	173.3869	184.0020	204.7484	(62)
PV diverter	-22.6941	-20.0709	-21.0171	-17.4030	-16.2189	-13.8787	-13.0090	-13.8338	-14.3594	-16.9282	-19.1775	-22.2739	(63a)
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	(63b)
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	(63c)
Output from w/h	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)
12Total per year (kWh/year)	184.2883	163.1445	173.8580	154.2778	150.4832	136.6210	135.6359	140.4868	141.4229	156.4587	164.8244	182.4745	(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)
Heat gains from water heating, kWh/month													
	90.6048	80.5942	86.5791	78.1643	77.2116	71.1216	71.2076	73.0947	72.8781	79.4343	82.2611	89.8620	(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	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	67.6148	74.8592	67.6148	69.8686	67.6148	69.8686	67.6148	67.6148	69.8686	67.6148	69.8686	67.6148	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969	(68)
Pumps, fans	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	(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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Total internal gains	121.7806	119.9318	116.3697	108.5615	103.7790	98.7799	95.7091	98.2456	101.2195	106.7665	114.2515	120.7822	(72)
	369.8472	376.6096	362.3589	349.4725	333.1807	318.7367	307.6008	308.7705	317.4424	331.0676	350.0618	363.0375	(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							
Northwest		8.1000	11.2829	0.6300	0.7000	0.7700	27.9305	(81)					

Full SAP Calculation Printout



Solar gains	27.9305	56.8534	102.4317	168.2224	226.1238	241.0720	225.5179	179.7855	124.8147	69.4794	35.1438	22.8095 (83)
Total gains	397.7777	433.4630	464.7907	517.6948	559.3046	559.8087	533.1186	488.5560	442.2571	400.5469	385.2057	385.8470 (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	138.9207	139.4594	139.9915	142.5461	143.0344	145.3526	145.3526	145.7901	144.4508	143.0344	142.0499	141.0351
alpha	10.2614	10.2973	10.3328	10.5031	10.5356	10.6902	10.6902	10.7193	10.6301	10.5356	10.4700	10.4023
util living area	0.9900	0.9742	0.9214	0.7424	0.5329	0.3608	0.2605	0.2962	0.4953	0.8096	0.9654	0.9920 (86)
MIT	20.7098	20.8025	20.9137	20.9907	20.9997	21.0000	21.0000	21.0000	20.9999	20.9830	20.8580	20.6983 (87)
Th 2	20.2965	20.2990	20.3015	20.3132	20.3154	20.3257	20.3257	20.3275	20.3217	20.3154	20.3110	20.3064 (88)
util rest of house	0.9860	0.9649	0.8987	0.7037	0.4938	0.3228	0.2205	0.2529	0.4467	0.7649	0.9517	0.9887 (89)
MIT 2	19.9753	20.0906	20.2200	20.3062	20.3152	20.3257	20.3257	20.3275	20.3217	20.3031	20.1689	19.9696 (90)
Living area fraction	20.4292	20.5305	20.6487	20.7292	20.7382	20.7424	20.7424	20.7431	20.7408	20.7232	20.5947	20.4199 (91)
MIT	20.4292	20.5305	20.6487	20.7292	20.7382	20.7424	20.7424	20.7431	20.7408	20.7232	20.5947	20.4199 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4292	20.5305	20.6487	20.7292	20.7382	20.7424	20.7424	20.7431	20.7408	20.7232	20.5947	20.4199 (93)

8. Space heating requirement

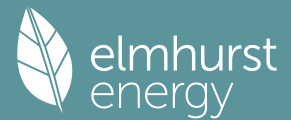
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9868	0.9683	0.9106	0.7273	0.5180	0.3463	0.2452	0.2797	0.4767	0.7921	0.9579	0.9893 (94)
Useful gains	392.5411	419.7304	423.2288	376.5413	289.7059	193.8351	130.7220	136.6449	210.8311	317.2621	368.9712	381.7260 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	532.5606	514.1003	463.5930	380.6476	289.8431	193.8366	130.7220	136.6450	210.8732	324.6398	435.7589	527.5253 (97)
Space heating kWh	104.1745	63.4166	30.0310	2.9565	0.1021	0.0000	0.0000	0.0000	0.0000	5.4890	48.0871	108.4747 (98a)
Space heating requirement - total per year (kWh/year)												362.7315
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	104.1745	63.4166	30.0310	2.9565	0.1021	0.0000	0.0000	0.0000	0.0000	5.4890	48.0871	108.4747 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												362.7315
Space heating per m2										(98c) / (4) =		8.2439 (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	104.1745	63.4166	30.0310	2.9565	0.1021	0.0000	0.0000	0.0000	0.0000	5.4890	48.0871	108.4747 (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)	112.8651	68.7070	32.5363	3.2032	0.1106	0.0000	0.0000	0.0000	0.0000	5.9469	52.0987	117.5240 (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	104.2883	163.1445	173.8580	154.2778	150.4832	136.6210	135.6359	140.4868	141.4229	156.4587	164.8244	182.4745 (64)
Efficiency of water heater (217)m	82.8318	82.1300	81.0093	79.9524	79.8055	79.8000	79.8000	79.8000	79.8000	80.0751	81.6695	79.8000 (216)
Fuel for water heating, kWh/month	222.4850	198.6419	214.6148	192.9621	188.5624	171.2042	169.9698	176.0486	177.2217	195.3901	201.8189	220.0243 (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	14.0490	11.2706	10.1480	7.4348	5.7429	4.6920	5.2388	6.8097	8.8451	11.6052	13.1080	14.4395 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-4.9069	-7.6372	-12.1067	-15.0620	-17.5785	-16.9173	-16.7210	-15.1089	-12.5303	-9.3364	-5.6459	-4.1632 (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	-0.9499	-2.0869	-4.3188	-6.7461	-9.1789	-9.3120	-9.1946	-7.6582	-5.4560	-3.0583	-1.2915	-0.7443 (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												392.9918 (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												2328.9438 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

Full SAP Calculation Printout



Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	113.3836 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-197.7100 (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	2723.6092 (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	392.9918	0.2100	82.5283 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2328.9438	0.2100	489.0782 (264)
Space and water heating			571.6065 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	113.3836	0.1443	16.3648 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.7143	0.1326	-18.2562
PV Unit electricity exported	-59.9957	0.1248	-7.4870
Total			-25.7432 (269)
Total CO2, kg/year			574.1573 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.0500 (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	392.9918	1.1300	444.0808 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2328.9438	1.1300	2631.7065 (278)
Space and water heating			3075.7873 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	113.3836	1.5338	173.9115 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.7143	1.4898	-205.1701
PV Unit electricity exported	-59.9957	0.4580	-27.4794
Total			-232.6495 (283)
Total Primary energy kWh/year			3147.1501 (286)
Target Primary Energy Rate (TPER)			71.5300 (287)

Full SAP Calculation Printout



Property Reference	Unit 7			Issued on Date	23/04/2025
Assessment Reference	A1-2-11-2B3P	Prop Type Ref	A1-2-11-2B3P		
Property					
SAP Rating	88 B	DER	3.54	TER	12.39
Environmental	98 A	% DER < TER			71.43
CO ₂ Emissions (t/year)	0.17	DFEE	23.35	TFEE	24.67
Compliance Check	See BREL	% DFEE < TFEE			5.37
% DPER < TPER	45.13	DPER	37.03	TPER	67.49
Assessor Details	Mr. Callum MacGillivray			Assessor ID	U682-0001
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	61.6100 (1b)	2.4000 (2b)	147.8640 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.6100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	147.8640 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												71.2000 (23c)
Effective ac	0.3066	0.3034	0.3002	0.2843	0.2811	0.2651	0.2651	0.2619	0.2715	0.2811	0.2874	0.2938 (25)

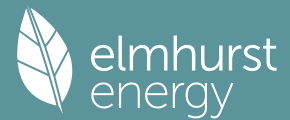
3. Heat losses and heat loss parameter

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							
Window			14.1750	1.1450	16.2366		(27)
Wall 1	38.4000	14.1750	24.2250	0.1500	3.6338	190.0000	4602.7503 (29a)
Total net area of external elements Aum(A, m ²)			38.4050				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.8704		(33)
Main dwelling							
Party wall 1			38.4720	0.0000	0.0000	180.0000	6924.9600 (32)
Party floor 1			61.6100			40.0000	2464.4000 (32d)
Party ceiling 1			61.6100			30.0000	1848.3000 (32b)
Internal Wall 1			65.1800			75.0000	4888.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	20728.9103 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		336.4537 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.3000	0.0500	0.3150
E2 Other lintels (including other steel lintels)			

Full SAP Calculation Printout



E4 Jamb	18.0000	0.0500	0.9000
E7 Party floor between dwellings (in blocks of flats)	32.0000	0.0700	2.2400
E16 Corner (normal)	2.4000	0.0900	0.2160
E18 Party wall between dwellings	4.8000	0.0600	0.2880
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	32.0600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.9590 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	23.8294 (37)

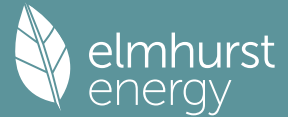
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	14.9588	14.8032	14.6477	13.8700	13.7145	12.9368	12.9368	12.7813	13.2479	13.7145	14.0255	14.3366 (38)
Average = Sum(39)m / 12 =	38.7881	38.6326	38.4771	37.6994	37.5439	36.7662	36.7662	36.6107	37.0773	37.5439	37.8549	38.1660 (39)
												37.6605
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6296	0.6271	0.6245	0.6119	0.6094	0.5968	0.5968	0.5942	0.6018	0.6094	0.6144	0.6195 (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												2.0268 (42)
Hot water usage for mixer showers												
Hot water usage for baths	58.2019	57.3272	56.0526	53.6140	51.8144	49.8074	48.6667	49.9316	51.3182	53.4730	55.9640	57.9789 (42a)
Hot water usage for other uses	25.1519	24.7784	24.2524	23.2825	22.5562	21.7509	21.3160	21.8383	22.4070	23.2687	24.2586	25.0669 (42b)
Average daily hot water use (litres/day)	35.3862	34.0994	32.8126	31.5258	30.2391	28.9523	28.9523	30.2391	31.5258	32.8126	34.0994	35.3862 (42c)
												109.1492 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	118.7399	116.2050	113.1176	108.4223	104.6097	100.5107	98.9349	102.0090	105.2510	109.5544	114.3220	118.4319 (44)
Energy content (annual)	188.0550	165.4743	173.8576	148.4248	140.8247	123.5896	119.6532	126.3084	129.7851	148.6642	162.8726	185.4358 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1812.9454
Water storage loss:	28.2083	24.8211	26.0786	22.2637	21.1237	18.5384	17.9480	18.9463	19.4678	22.2996	24.4309	27.8154 (46)
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	217.6848	192.2367	203.4874	177.0988	170.4545	152.2636	149.2830	155.9382	158.4591	178.2940	191.5466	215.0656 (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	217.6848	192.2367	203.4874	177.0988	170.4545	152.2636	149.2830	155.9382	158.4591	178.2940	191.5466	215.0656 (64)
12Total per year (kWh/year)												2161.8124 (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)
Heat gains from water heating, kWh/month	62.5283	55.0202	57.8076	49.3512	46.8242	41.0935	39.7847	41.9975	43.1535	49.4309	54.1552	61.6574 (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	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	89.2703	98.8350	89.2703	92.2460	89.2703	92.2460	89.2703	89.2703	92.2460	89.2703	92.2460	89.2703 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	176.9884	178.8249	174.1968	164.3441	151.9067	140.2174	132.4082	130.5716	135.1997	145.0525	157.4898	169.1792 (68)
Pumps, fans	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708 (71)
Total internal gains	84.0434	81.8753	77.6984	68.5434	62.9358	57.0744	53.4741	56.4483	59.9355	66.4393	75.2155	82.8728 (72)
	403.7036	412.9368	394.5671	378.5350	357.5144	342.9393	328.5541	329.6918	340.7827	354.1637	378.3529	394.7239 (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					
Northeast			8.1000	11.2829	0.4000	0.8000	0.7700	20.2671 (75)				
Northwest			6.0750	11.2829	0.4000	0.8000	0.7700	15.2003 (81)				
Solar gains	35.4673	72.1948	130.0721	213.6157	287.1414	306.1231	286.3719	228.2990	158.4948	88.2278	44.6271	28.9644 (83)
Total gains	439.1710	485.1316	524.6392	592.1507	644.6558	649.0624	614.9260	557.9908	499.2776	442.3914	422.9799	423.6883 (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	148.4482	149.0459	149.6483	152.7353	153.3681	156.6121	156.6121	157.2774	155.2981	153.3681	152.1078	150.8680
alpha	10.8965	10.9364	10.9766	11.1824	11.2245	11.4408	11.4408	11.4852	11.3532	11.2245	11.1405	11.0579
util living area	0.9953	0.9847	0.9417	0.7604	0.5414	0.3625	0.2631	0.3018	0.5123	0.8500	0.9815	0.9965 (86)
MIT	20.6890	20.7869	20.9057	20.9913	20.9998	21.0000	21.0000	21.0000	20.9999	20.9787	20.8357	20.6762 (87)
Th 2	20.4035	20.4057	20.4080	20.4193	20.4216	20.4329	20.4329	20.4352	20.4284	20.4216	20.4170	20.4125 (88)
util rest of house	0.9935	0.9794	0.9253	0.7271	0.5078	0.3304	0.2292	0.2648	0.4699	0.8134	0.9741	0.9952 (89)
MIT 2	20.1255	20.2227	20.3345	20.4138	20.4214	20.4329	20.4329	20.4352	20.4283	20.4084	20.2808	20.1210 (90)
Living area fraction									fLA = Living area / (4) =			0.5038 (91)
MIT	20.4094	20.5070	20.6223	20.7047	20.7128	20.7186	20.7186	20.7198	20.7163	20.6957	20.5604	20.4007 (92)
Temperature adjustment												0.3000
adjusted MIT	20.7094	20.8070	20.9223	21.0047	21.0128	21.0186	21.0186	21.0198	21.0163	20.9957	20.8604	20.7007 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9945	0.9831	0.9398	0.7606	0.5421	0.3636	0.2642	0.3031	0.5135	0.8498	0.9799	0.9959 (94)
Useful gains	436.7542	476.9489	493.0412	450.4102	349.4721	235.9869	162.4559	169.1320	256.3729	375.9260	414.4864	421.9419 (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	636.4897	614.5282	554.9276	456.3416	349.6388	235.9883	162.4560	169.1322	256.4376	390.2942	520.8973	629.7674 (97)
Space heating kWh	148.6032	92.4533	46.0435	4.2706	0.1240	0.0000	0.0000	0.0000	0.0000	10.6899	76.6159	154.6222 (98a)
Space heating requirement - total per year (kWh/year)												533.4226
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	148.6032	92.4533	46.0435	4.2706	0.1240	0.0000	0.0000	0.0000	0.0000	10.6899	76.6159	154.6222 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												533.4226
Space heating per m2										(98c) / (4) =		8.6581 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	148.6032	92.4533	46.0435	4.2706	0.1240	0.0000	0.0000	0.0000	0.0000	10.6899	76.6159	154.6222 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	148.6032	92.4533	46.0435	4.2706	0.1240	0.0000	0.0000	0.0000	0.0000	10.6899	76.6159	154.6222 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	217.6848	192.2367	203.4874	177.0988	170.4545	152.2636	149.2830	155.9382	158.4591	178.2940	191.5466	215.0656 (64)
Efficiency of water heater	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935	338.0935 (216)
Fuel for water heating, kWh/month	64.3860	56.8591	60.1867	52.3816	50.4164	45.0359	44.1544	46.1228	46.8684	52.7351	56.6549	63.6113 (219)
Space cooling fuel requirement	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	13.0843	11.8180	13.0843	12.6622	13.0843	12.6622	13.0843	13.0843	12.6622	13.0843	12.6622	13.0843 (231)
Lighting	18.4005	14.7616	13.2912	9.7377	7.5217	6.1453	6.8615	8.9189	11.5847	15.1998	17.1681	18.9119 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	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)	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)	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)	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)	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)	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)	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)	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												533.4226 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												338.0935
Water heating fuel used												639.4127 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)												
mechanical ventilation fans (SFP = 0.8540)												154.0566 (230a)
Total electricity for the above, kWh/year												154.0566 (231)
Electricity for lighting (calculated in Appendix L)												148.5028 (232)

Full SAP Calculation Printout



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	1475.3946 (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	533.4226	0.1592	84.9128 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	639.4127	0.1411	90.2311 (264)
Space and water heating			175.1439 (265)
Pumps, fans and electric keep-hot	154.0566	0.1387	21.3695 (267)
Energy for lighting	148.5028	0.1443	21.4335 (268)
Total CO2, kg/year			217.9470 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5400 (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	533.4226	1.5892	847.7143 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	639.4127	1.5218	973.0615 (278)
Space and water heating			1820.7758 (279)
Pumps, fans and electric keep-hot	154.0566	1.5128	233.0568 (281)
Energy for lighting	148.5028	1.5338	227.7786 (282)
Total Primary energy kWh/year			2281.6111 (286)
Dwelling Primary energy Rate (DPER)			37.0300 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	61.6100 (1b)	x 2.4000 (2b)	= 147.8640 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.6100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 147.8640 (5)

2. Ventilation rate

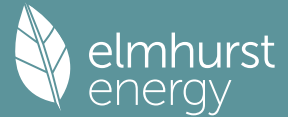
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1353 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3853 (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) = 0.3275 (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	0.4175	0.4093	0.4012	0.3602	0.3520	0.3111	0.3111	0.3029	0.3275	0.3520	0.3684	0.3848 (22b)
Effective ac	0.5872	0.5838	0.5805	0.5649	0.5620	0.5484	0.5484	0.5459	0.5536	0.5620	0.5679	0.5740 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
TER Opening Type			14.1750	1.1450	16.2366			(27)					
Wall 1	38.4000	14.1750	24.2250	0.1800	4.3605			(29a)					
Total net area of external elements Aum(A, m2)			38.4050					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.5971			(33)					
Main dwelling													
Party wall 1			38.4720	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							346.4537	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				6.3000	0.0500	0.3150							
E4 Jamb				18.0000	0.0500	0.9000							
E7 Party floor between dwellings (in blocks of flats)				32.0000	0.0700	2.2400							
E16 Corner (normal)				2.4000	0.0900	0.2160							
E18 Party wall between dwellings				4.8000	0.0600	0.2880							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				32.0600	0.0000	0.0000							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.9590	(36)					
Point Thermal bridges							0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	24.5561	(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	28.6507	28.4856	28.3237	27.5633	27.4210	26.7588	26.7588	26.6361	27.0139	27.4210	27.7088	28.0097	(38)
Average = Sum(39)m / 12 =	53.2069	53.0417	52.8798	52.1194	51.9772	51.3149	51.3149	51.1923	51.5700	51.9772	52.2650	52.5659	(39)
												52.1188	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8636	0.8609	0.8583	0.8460	0.8436	0.8329	0.8329	0.8309	0.8370	0.8436	0.8483	0.8532	(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													2.0268	(42)
Hot water usage for mixer showers														
Hot water usage for baths	58.2019	57.3272	56.0526	53.6140	51.8144	49.8074	48.6667	49.9316	51.3182	53.4730	55.9640	57.9789	(42a)	
Hot water usage for other uses	25.1519	24.7784	24.2524	23.2825	22.5562	21.7509	21.3160	21.8383	22.4070	23.2687	24.2586	25.0669	(42b)	
Average daily hot water use (litres/day)	35.3862	34.0994	32.8126	31.5258	30.2391	28.9523	28.9523	30.2391	31.5258	32.8126	34.0994	35.3862	(42c)	
													109.1492	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	118.7399	116.2050	113.1176	108.4223	104.6097	100.5107	98.9349	102.0090	105.2510	109.5544	114.3220	118.4319	(44)	
Energy content (annual)	188.0550	165.4743	173.8576	148.4248	140.8247	123.5896	119.6532	126.3084	129.7851	148.6642	162.8726	185.4358	(45)	
Distribution loss (46)m = 0.15 x (45)m	28.2083	24.8211	26.0786	22.2637	21.1237	18.5384	17.9480	18.9463	19.4678	22.2996	24.4309	27.8154	(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	234.6499	207.5601	220.4525	193.5166	187.4196	168.6814	166.2481	172.9033	174.8769	195.2591	207.9645	232.0307	(62)	
WWHRS	-26.6075	-23.5319	-24.6412	-20.4039	-19.0157	-16.2719	-15.2523	-16.2193	-16.8355	-19.8472	-22.4845	-26.1147	(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	208.0425	184.0282	195.8113	173.1127	168.4039	152.4096	150.9959	156.6840	158.0414	175.4119	185.4800	205.9159	(64)	
12Total per year (kWh/year)													2114.3374	(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	99.8042	88.6888	95.0836	85.4247	84.1001	77.1670	77.0606	79.2735	79.2270	86.7068	90.2286	98.9333	(65)	

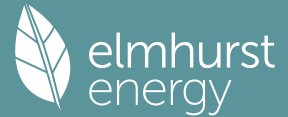
5. Internal gains (see Table 5 and 5a)

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	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	101.3385	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	89.2703	98.8350	89.2703	92.2460	89.2703	92.2460	89.2703	89.2703	92.2460	89.2703	92.2460	89.2703	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	176.9884	178.8249	174.1968	164.3441	151.9067	140.2174	132.4082	130.5716	135.1997	145.0525	157.4898	169.1792	(68)	
Pumps, fans	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	33.1339	(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)	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	(71)	
Total internal gains	134.1455	131.9774	127.8005	118.6454	113.0378	107.1764	103.5761	106.5504	110.0375	116.5414	125.3175	132.9749	(72)	
	456.8057	466.0389	447.6692	431.6370	410.6164	393.0413	378.6562	379.7938	390.8848	407.2657	431.4549	447.8259	(73)	

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W

Full SAP Calculation Printout



W/m2													or Table 6b		or Table 6c		Table 6d	
Northeast				8.1000		11.2829		0.6300		0.7000		0.7700		27.9305 (75)				
Northwest				6.0750		11.2829		0.6300		0.7000		0.7700		20.9479 (81)				
Solar gains		48.8784	99.4935	179.2556	294.3891	395.7167	421.8759	394.6563	314.6246	218.4257	121.5889	61.5017	39.9166 (83)					
Total gains		505.6841	565.5323	626.9247	726.0261	806.3332	814.9173	773.3124	694.4184	609.3105	528.8546	492.9566	487.7425 (84)					
7. Mean internal temperature (heating season)																		
Temperature during heating periods in the living area from Table 9, Th1 (C)																		
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		111.4362	111.7832	112.1254	113.7612	114.0725	115.5447	115.5447	115.8215	114.9732	114.0725	113.4444	112.7951					
alpha		8.4291	8.4522	8.4750	8.5841	8.6048	8.7030	8.7030	8.7214	8.6649	8.6048	8.5630	8.5197					
util living area		0.9963	0.9894	0.9611	0.8226	0.5965	0.4029	0.2920	0.3391	0.5817	0.9054	0.9881	0.9971 (86)					
MIT		20.4656	20.5909	20.7718	20.9535	20.9967	20.9999	21.0000	21.0000	20.9980	20.9140	20.6668	20.4482 (87)					
Th 2		20.1985	20.2008	20.2031	20.2137	20.2157	20.2249	20.2249	20.2266	20.2213	20.2157	20.2117	20.2075 (88)					
util rest of house		0.9947	0.9852	0.9471	0.7826	0.5475	0.3542	0.2405	0.2821	0.5173	0.8688	0.9825	0.9959 (89)					
MIT 2		19.5875	19.7473	19.9697	20.1753	20.2136	20.2249	20.2249	20.2266	20.2204	20.1436	19.8528	19.5726 (90)					
Living area fraction		fLA = Living area / (4) =																
MIT		20.0299	20.1723	20.3738	20.5674	20.6081	20.6153	20.6154	20.6163	20.6122	20.5318	20.2629	20.0137 (92)					
Temperature adjustment		0.0000																
adjusted MIT		20.0299	20.1723	20.3738	20.5674	20.6081	20.6153	20.6154	20.6163	20.6122	20.5318	20.2629	20.0137 (93)					
8. Space heating requirement																		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Utilisation		0.9943	0.9850	0.9504	0.8012	0.5722	0.3787	0.2664	0.3108	0.5497	0.8847	0.9830	0.9956 (94)					
Useful gains		502.7953	557.0605	595.8532	581.6986	461.3451	308.6358	206.0489	215.8340	334.9676	467.8944	484.5605	485.5827 (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		836.9385	810.0700	733.6433	608.0965	463.0195	308.6768	206.0504	215.8396	335.8343	516.2248	687.9581	831.2627 (97)					
Space heating kWh		248.6026	170.0224	102.5158	19.0065	1.2457	0.0000	0.0000	0.0000	0.0000	35.9578	146.4462	257.1860 (98a)					
Space heating requirement - total per year (kWh/year)		980.9830																
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		248.6026	170.0224	102.5158	19.0065	1.2457	0.0000	0.0000	0.0000	0.0000	35.9578	146.4462	257.1860 (98c)					
Space heating requirement after solar contribution - total per year (kWh/year)		980.9830																
Space heating per m2		(98c) / (4) = 15.9225 (99)																
9a. Energy requirements - Individual heating systems, including micro-CHP																		
Fraction of space heat from secondary/supplementary system (Table 11)																		
Fraction of space heat from main system(s)																		
Efficiency of main space heating system 1 (in %)																		
Efficiency of main space heating system 2 (in %)																		
Efficiency of secondary/supplementary heating system, %																		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Space heating requirement		248.6026	170.0224	102.5158	19.0065	1.2457	0.0000	0.0000	0.0000	0.0000	35.9578	146.4462	257.1860 (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)		269.3419	184.2063	111.0681	20.5921	1.3497	0.0000	0.0000	0.0000	0.0000	38.9575	158.6633	278.6414 (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		208.0425	184.0282	195.8113	173.1127	168.4039	152.4096	150.9959	156.6840	158.0414	175.4119	185.4800	205.9159 (64)					
Water heating requirement		84.4602	83.8827	82.6796	80.6082	79.8594	79.8000	79.8000	79.8000	79.8000	81.2000	83.5354	79.8000 (216)					
Efficiency of water heater (217)m		246.3200	219.3877	236.8315	214.7581	210.8755	190.9894	189.2179	196.3459	198.0469	216.0245	222.0376	84.5595 (217)					
Fuel for water heating, kWh/month		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)					
Space cooling fuel requirement (221)m		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)					
Pumps and Fa		18.5486	14.8804	13.3981	9.8160	7.5822	6.1947	6.9167	8.9906	11.6779	15.3221	17.3063	19.0641 (232)					
Lighting		Electricity generated by PVs (Appendix M) (negative quantity)																
Electricity generated by PVs (Appendix M) (negative quantity)		-6.8269	-10.6009	-16.7643	-20.8005	-24.2181	-23.2779	-22.9993	-20.8048	-17.2928	-12.9297	-7.8443	-5.7943 (233a)					
Electricity generated by wind turbines (Appendix M) (negative quantity)		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)		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)		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)		-1.3740	-3.0151	-6.2352	-9.7359	-13.2483	-13.4491	-13.2884	-11.0743	-7.8921	-4.4257	-1.8696	-1.0773 (233b)					
Electricity generated by wind turbines (Appendix M) (negative quantity)		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)		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)		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		1062.8202 (211)																
Space heating fuel - main system 2		0.0000 (213)																
Space heating fuel - secondary		0.0000 (215)																
Efficiency of water heater		79.8000																

Full SAP Calculation Printout



Water heating fuel used	2584.3510 (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)	149.6979 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-276.8390 (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	3606.0300 (238)

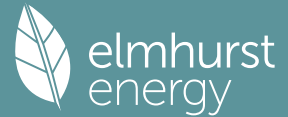
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1062.8202	0.2100	223.1922 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2584.3510	0.2100	542.7137 (264)
Space and water heating			765.9059 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	149.6979	0.1443	21.6060 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-190.1539	0.1326	-25.2187
PV Unit electricity exported	-86.6851	0.1248	-10.8171
Total			-36.0358 (269)
Total CO2, kg/year			763.4055 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3900 (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	1062.8202	1.1300	1200.9868 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2584.3510	1.1300	2920.3166 (278)
Space and water heating			4121.3034 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	149.6979	1.5338	229.6116 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-190.1539	1.4900	-283.3362
PV Unit electricity exported	-86.6851	0.4580	-39.7014
Total			-323.0377 (283)
Total Primary energy kWh/year			4157.9781 (286)
Target Primary Energy Rate (TPER)			67.4900 (287)

Full SAP Calculation Printout



Property Reference	Unit 8				Issued on Date	23/04/2025
Assessment Reference	A2-8-1-3B5P		Prop Type Ref	A2-8-1-3B5P		
Property						
SAP Rating	76 C	DER	6.02	TER	14.08	
Environmental	95 A	% DER < TER				57.24
CO ₂ Emissions (t/year)	0.42	DFEE	39.85	TFEE	39.70	
Compliance Check	See BREL	% DFEE < TFEE				-0.37
% DPER < TPER	18.70	DPER	61.96	TPER	76.21	
Assessor Details	Mr. Callum MacGillivray				Assessor ID	U682-0001
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	87.0300 (1b)	2.4000 (2b)	208.8720 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.0300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	208.8720 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

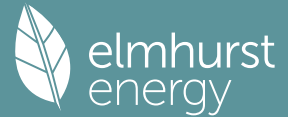
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (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) =												71.2000 (23c)
Effective ac	0.3209	0.3174	0.3140	0.2966	0.2932	0.2758	0.2758	0.2723	0.2827	0.2932	0.3001	0.3070 (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							
Window			22.2750	1.1450	25.5115		(27)
Wall 1	65.1840	22.2750	42.9090	0.1500	6.4363	190.0000	8152.7096 (29a)
Shelt wall 1	17.0640		17.0640	0.1500	2.5596	190.0000	3242.1598 (29a)
HLR	87.0300		87.0300	0.1000	8.7030	9.0000	783.2700 (30)
Total net area of external elements Aum(A, m ²)			169.2830				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.2104		(33)
Main dwelling							
Party wall 1			30.7200	0.0000	0.0000	180.0000	5529.5999 (32)
Party floor 1			87.0300			40.0000	3481.2000 (32d)
Internal Wall 1			69.9300			75.0000	5244.7500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 26433.6894 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							303.7308 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	9.9000	0.0500	0.4950
E4 Jamb	27.0000	0.0500	1.3500
E7 Party floor between dwellings (in blocks of flats)	34.2700	0.0700	2.3989
E14 Flat roof	7.1100	0.0800	0.5688
E15 Flat roof with parapet	27.1600	0.5600	15.2096
E16 Corner (normal)	7.2000	0.0900	0.6480
E18 Party wall between dwellings	2.4000	0.0600	0.1440
E25 Staggered party wall between dwellings	2.4000	0.0600	0.1440
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.8000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	12.8000	0.1200	1.5360

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 22.4943 (36)
 Point Thermal bridges 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 65.7047 (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	22.1193	21.8803	21.6412	20.4457	20.2066	19.0111	19.0111	18.7720	19.4893	20.2066	20.6848	21.1630 (38)
Average = Sum(39)m / 12 =	87.8240	87.5850	87.3459	86.1504	85.9113	84.7158	84.7158	84.4767	85.1940	85.9113	86.3895	86.8677 (39)
												86.0906

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0091	1.0064	1.0036	0.9899	0.9871	0.9734	0.9734	0.9707	0.9789	0.9871	0.9926	0.9981 (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	2.5828 (42)											
Hot water usage for mixer showers	67.2556 66.5108 65.0321 62.2028 60.1149 57.7864 56.4629 57.9305 59.5391 62.0392 64.9293 67.2669 (42a)											
Hot water usage for baths	29.1614 28.7283 28.1185 26.9940 26.1519 25.2183 24.7140 25.3196 25.9790 26.9780 28.1257 29.0629 (42b)											
Hot water usage for other uses	41.0809 39.5871 38.0932 36.5994 35.1055 33.6117 33.6117 35.1055 36.5994 38.0932 39.5871 41.0809 (42c)											
Average daily hot water use (litres/day)	126.6399 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	137.7680	134.8262	131.2438	125.7961	121.3723	116.6164	114.7885	118.3556	122.1175	127.1105	132.6420	137.4107 (44)
Energy content (annual)	218.1908	191.9908	201.7168	172.2086	163.3905	143.3934	138.8268	146.5489	150.5831	172.4877	188.9729	215.1519 (45)
Distribution loss (46)m = 0.15 x (45)m	32.7286 28.7986 30.2575 25.8313 24.5086 21.5090 20.8240 21.9823 22.5875 25.8732 28.3459 32.2728 (46)											
Water storage loss:												
Store volume	269.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.7700 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.9558 (55)											
Total storage loss												
If cylinder contains dedicated solar storage	29.6298 26.7624 29.6298 28.6740 29.6298 28.6740 29.6298 29.6298 28.6740 29.6298 28.6740 29.6298 (56)											
Primary loss	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)											
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 (58)											
Total heat required for water heating calculated for each month	247.8206 218.7532 231.3466 200.8826 193.0203 172.0674 168.4566 176.1787 179.2571 202.1175 217.6469 244.7817 (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	247.8206 218.7532 231.3466 200.8826 193.0203 172.0674 168.4566 176.1787 179.2571 202.1175 217.6469 244.7817 (64)											
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2452.3292 (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)											
Heat gains from water heating, kWh/month	72.5484 63.8369 67.0708 57.2594 54.3273 47.6783 46.1599 48.7275 50.0689 57.3522 62.8335 71.5380 (65)											

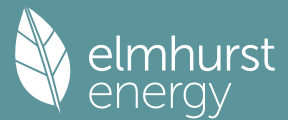
5. Internal gains (see Table 5 and 5a)

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	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	117.7771	130.3961	117.7771	121.7031	117.7771	121.7031	117.7771	117.7771	121.7031	117.7771	121.7031	117.7771 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	233.5064	235.9294	229.8234	216.8243	200.4154	184.9933	174.6903	172.2673	178.3733	191.3724	207.7813	223.2035 (68)
Pumps, fans	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139 (71)
Total internal gains	97.5113	94.9954	90.1490	79.5269	73.0206	66.2199	62.0429	65.4940	69.5401	77.0862	87.2687	96.1532 (72)
	510.5376	523.0637	499.4922	479.7970	452.9558	434.6589	416.2531	417.2811	431.3592	447.9785	478.4958	498.8765 (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
Northeast	3.0375	11.2829	0.4000	0.8000	0.7700	7.6001 (75)
Southeast	14.1750	36.7938	0.4000	0.8000	0.7700	115.6595 (77)
Southwest	5.0625	36.7938	0.4000	0.8000	0.7700	41.3070 (79)

Full SAP Calculation Printout



Solar gains	164.5666	282.8423	393.7026	499.0559	569.2429	569.6389	547.3148	494.2623	430.0797	314.4089	197.5726	140.5372 (83)
Total gains	675.1042	805.9060	893.1948	978.8529	1022.1987	1004.2978	963.5679	911.5433	861.4389	762.3874	676.0684	639.4138 (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	83.6068	83.8351	84.0646	85.2311	85.4683	86.6744	86.6744	86.9197	86.1879	85.4683	84.9952	84.5273
alpha	6.5738	6.5890	6.6043	6.6821	6.6979	6.7783	6.7783	6.7946	6.7459	6.6979	6.6663	6.6352
util living area	0.9967	0.9891	0.9684	0.8955	0.7431	0.5360	0.3865	0.4256	0.6650	0.9281	0.9904	0.9976 (86)
MIT	20.1455	20.3399	20.5674	20.8209	20.9574	20.9958	20.9996	20.9993	20.9838	20.7992	20.4266	20.1142 (87)
Th 2	20.0757	20.0780	20.0803	20.0918	20.0941	20.1056	20.1056	20.1079	20.1010	20.0941	20.0895	20.0849 (88)
util rest of house	0.9954	0.9851	0.9571	0.8632	0.6839	0.4630	0.3081	0.3435	0.5862	0.8975	0.9862	0.9967 (89)
MIT 2	19.3077	19.5014	19.7234	19.9630	20.0703	20.1041	20.1055	20.1077	20.0942	19.9521	19.5979	19.2842 (90)
Living area fraction	19.6830	19.8769	20.1014	20.3472	20.4676	20.5035	20.5059	20.5070	20.4926	20.3315	19.9691	0.4479 (91)
MIT	19.6830	19.8769	20.1014	20.3472	20.4676	20.5035	20.5059	20.5070	20.4926	20.3315	19.9691	19.6559 (92)
Temperature adjustment												0.3000
adjusted MIT	19.9830	20.1769	20.4014	20.6472	20.7676	20.8035	20.8059	20.8070	20.7926	20.6315	20.2691	19.9559 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9953	0.9856	0.9615	0.8839	0.7286	0.5202	0.3695	0.4079	0.6475	0.9169	0.9871	0.9966 (94)
Useful gains	671.9195	794.3070	858.7832	865.1665	744.7410	522.4047	356.0456	371.7886	557.7500	699.0331	667.3671	637.2229 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1377.3420	1338.0285	1214.2298	1012.0302	779.0105	525.5323	356.3104	372.2908	570.1732	861.8211	1137.6713	1368.6799 (97)
Space heating kWh	524.8344	365.3809	264.4523	105.7418	25.4965	0.0000	0.0000	0.0000	0.0000	121.1143	338.6190	544.2040 (98a)
Space heating requirement - total per year (kWh/year)												2289.8431
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	524.8344	365.3809	264.4523	105.7418	25.4965	0.0000	0.0000	0.0000	0.0000	121.1143	338.6190	544.2040 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2289.8431
Space heating per m2										(98c) / (4) =		26.3110 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	524.8344	365.3809	264.4523	105.7418	25.4965	0.0000	0.0000	0.0000	0.0000	121.1143	338.6190	544.2040 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	524.8344	365.3809	264.4523	105.7418	25.4965	0.0000	0.0000	0.0000	0.0000	121.1143	338.6190	544.2040 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	247.8206	218.7532	231.3466	200.8826	193.0203	172.0674	168.4566	176.1787	179.2571	202.1175	217.6469	244.7817 (64)
Efficiency of water heater (217)m	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425	337.1425 (216)
Fuel for water heating, kWh/month	73.5062	64.8845	68.6198	59.5839	57.2518	51.0370	49.9660	52.2564	53.1695	59.9502	64.5563	72.6048 (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	18.4828	16.6941	18.4828	17.8865	18.4828	17.8865	18.4828	18.4828	17.8865	18.4828	17.8865	18.4828 (231)
Lighting	27.1669	21.7943	19.6234	14.3769	11.1051	9.0730	10.1305	13.1680	17.1039	22.4413	25.3474	27.9220 (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												2289.8431 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.1425
Water heating fuel used												727.3865 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)		
mechanical ventilation fans (SFP = 0.8540)	217.6196	(230a)
Total electricity for the above, kWh/year	217.6196	(231)
Electricity for lighting (calculated in Appendix L)	219.2527	(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	3454.1019	(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	2289.8431	0.1569	359.2650 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	727.3865	0.1412	102.6855 (264)
Space and water heating			461.9505 (265)
Pumps, fans and electric keep-hot	217.6196	0.1387	30.1865 (267)
Energy for lighting	219.2527	0.1443	31.6449 (268)
Total CO2, kg/year			523.7820 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.0200 (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	2289.8431	1.5808	3619.8234 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	727.3865	1.5220	1107.0899 (278)
Space and water heating			4726.9133 (279)
Pumps, fans and electric keep-hot	217.6196	1.5128	329.2149 (281)
Energy for lighting	219.2527	1.5338	336.2971 (282)
Total Primary energy kWh/year			5392.4252 (286)
Dwelling Primary energy Rate (DPER)			61.9600 (287)

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

1. Overall dwelling characteristics

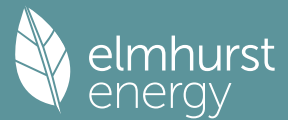
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	87.0300 (1b)	x 2.4000 (2b)	= 208.8720 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.0300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	208.8720 (5)

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) = 0.1436 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3936 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3641 (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	0.4642	0.4551	0.4460	0.4005	0.3914	0.3459	0.3459	0.3368	0.3641	0.3914	0.4096	0.4278 (22b)
Effective ac	0.6078	0.6036	0.5995	0.5802	0.5766	0.5598	0.5598	0.5567	0.5663	0.5766	0.5839	0.5915 (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 Opening Type			21.7600	1.1450	24.9160			(27)
Wall 1	65.1840	21.7600	43.4240	0.1800	7.8163			(29a)
Shelt wall 1	17.0640		17.0640	0.1800	3.0715			(29a)
HLR	87.0300		87.0300	0.1100	9.5733			(30)
Total net area of external elements Aum(A, m2)			169.2780					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		45.3772			(33)
Main dwelling								
Party wall 1			30.7200	0.0000	0.0000			(32)

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

303.7308 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	9.9000	0.0500	0.4950	
E2 Other lintels (including other steel lintels)	27.0000	0.0500	1.3500	
E4 Jamb	34.2700	0.0700	2.3989	
E7 Party floor between dwellings (in blocks of flats)	7.1100	0.0800	0.5688	
E14 Flat roof	27.1600	0.5600	15.2096	
E15 Flat roof with parapet	7.2000	0.0900	0.6480	
E16 Corner (normal)	2.4000	0.0600	0.1440	
E18 Party wall between dwellings	2.4000	0.0600	0.1440	
E25 Staggered party wall between dwellings	12.8000	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.8000	0.1200	1.5360	
P4 Party wall - Roof (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				22.4943 (36)
Point Thermal bridges				0.0000
Total fabric heat loss			(33) + (36) + (36a) =	67.8715 (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	
	41.8914	41.6029	41.3202	39.9924	39.7439	38.5874	38.5874	38.3732	39.0329	39.7439	40.2465	40.7720	(38)
Heat transfer coeff	109.7628	109.4744	109.1917	107.8638	107.6154	106.4589	106.4589	106.2447	106.9043	107.6154	108.1180	108.6434	(39)
Average = Sum(39)m / 12 =												107.8626	
HLP	1.2612	1.2579	1.2546	1.2394	1.2365	1.2232	1.2232	1.2208	1.2284	1.2365	1.2423	1.2483	(40)
HLP (average)												1.2394	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

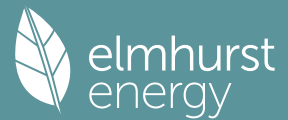
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5828 (42)
Hot water usage for mixer showers													
67.5256	66.5108	65.0321	62.2028	60.1149	57.7864	56.4629	57.9305	59.5391	62.0392	64.9293	67.2669		(42a)
Hot water usage for baths													
29.1614	28.7283	28.1185	26.9940	26.1519	25.2183	24.7140	25.3196	25.9790	26.9780	28.1257	29.0629		(42b)
Hot water usage for other uses													
41.0809	39.5871	38.0932	36.5994	35.1055	33.6117	33.6117	35.1055	36.5994	38.0932	39.5871	41.0809		(42c)
Average daily hot water use (litres/day)												126.6399	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	137.7680	134.8262	131.2438	125.7961	121.3723	116.6164	114.7885	118.3556	122.1175	127.1105	132.6420	137.4107	(44)
Energy conte	218.1908	191.9908	201.7168	172.2086	163.3905	143.3934	138.8268	146.5489	150.5831	172.4877	188.9729	215.1519	(45)
Energy content (annual)										Total = Sum(45)m =		2103.4622	
Distribution loss (46)m = 0.15 x (45)m													
32.7286	28.7986	30.2575	25.8313	24.5086	21.5090	20.8240	21.9823	22.5875	25.8732	28.3459	32.2728		(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	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	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	(58)
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													
264.7857	234.0765	248.3117	217.3005	209.9854	188.4853	185.4217	193.1438	195.6749	219.0826	234.0647	261.7468		(62)
WWHRS	-30.8699	-27.3016	-28.5886	-23.6725	-22.0619	-18.8786	-17.6956	-18.8175	-19.5325	-23.0266	-26.0864	-30.2982	(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	233.9158	206.7749	219.7231	193.6279	187.9234	169.6067	167.7261	174.3263	176.1425	196.0560	207.9783	231.4486	(64)
12Total per year (kWh/year)												2365.2496	(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	109.8244	97.5055	104.3468	93.3328	91.6033	83.7518	83.4358	86.0034	86.1424	94.6281	98.9070	108.8139	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	129.1423	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.7771	130.3961	117.7771	121.7031	117.7771	121.7031	117.7771	117.7771	121.7031	117.7771	121.7031	117.7771	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	233.5064	235.9294	229.8234	216.8243	200.4154	184.9933	174.6903	172.2673	178.3733	191.3724	207.7813	223.2035	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	35.9142	(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)	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	-103.3139	(71)
Water heating gains (Table 5)													

Full SAP Calculation Printout



Total internal gains	147.6134	145.0975	140.2510	129.6289	123.1227	116.3219	112.1449	115.5960	119.6422	127.1883	137.3708	146.2553 (72)
	563.6396	576.1658	552.5943	532.8990	506.0579	484.7609	466.3551	467.3831	481.4612	501.0805	531.5979	551.9786 (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
Northeast	2.9700			11.2829		0.6300		0.7000		0.7700		10.2412 (75)
Southeast	13.8500			36.7938		0.6300		0.7000		0.7700		155.7387 (77)
Southwest	4.9400			36.7938		0.6300		0.7000		0.7700		55.5487 (79)
Solar gains	221.5286	380.7469	529.9901	671.8283	766.3274	766.8662	736.8104	665.3803	578.9648	423.2426	265.9597	189.1815 (83)
Total gains	785.1682	956.9126	1082.5843	1204.7274	1272.3852	1251.6272	1203.1656	1132.7635	1060.4261	924.3231	797.5576	741.1601 (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	66.8960	67.0722	67.2459	68.0737	68.2309	68.9721	68.9721	69.1111	68.6847	68.2309	67.9137	67.5852
alpha	5.4597	5.4715	5.4831	5.5382	5.5487	5.5981	5.5981	5.6074	5.5790	5.5487	5.5276	5.5057
util living area	0.9944	0.9835	0.9570	0.8788	0.7307	0.5360	0.3881	0.4292	0.6648	0.9157	0.9856	0.9958 (86)
MIT	19.9110	20.1495	20.4331	20.7441	20.9261	20.9891	20.9985	20.9974	20.9661	20.7166	20.2561	19.8727 (87)
Th 2	19.8713	19.8740	19.8765	19.8886	19.8909	19.9015	19.9015	19.9034	19.8974	19.8909	19.8863	19.8815 (88)
util rest of house	0.9922	0.9774	0.9415	0.8401	0.6622	0.4480	0.2919	0.3282	0.5719	0.8785	0.9792	0.9942 (89)
MIT 2	18.6362	18.9386	19.2898	19.6578	19.8391	19.8966	19.9011	19.9028	19.8797	19.6405	19.0852	18.5950 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2071	19.4810	19.8019	20.1444	20.3260	20.3859	20.3926	20.3930	20.3663	20.1225	19.6096	19.1673 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2071	19.4810	19.8019	20.1444	20.3260	20.3859	20.3926	20.3930	20.3663	20.1225	19.6096	19.1673 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9905	0.9747	0.9403	0.8499	0.6903	0.4874	0.3351	0.3736	0.6129	0.8874	0.9771	0.9928 (94)
Useful gains	777.6892	932.7178	1017.9453	1023.8846	878.3027	609.9983	403.1629	423.1606	649.8921	820.2497	779.3185	735.7950 (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	1636.2507	1596.2420	1452.4563	1212.8610	928.2862	615.9629	403.7575	424.2390	669.8906	1024.7652	1352.5179	1626.0960 (97)
Space heating kWh	638.7698	445.8882	323.2761	136.0630	37.1877	0.0000	0.0000	0.0000	0.0000	152.1595	412.7036	662.3840 (98a)
Space heating requirement - total per year (kWh/year)												2808.4319
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	638.7698	445.8882	323.2761	136.0630	37.1877	0.0000	0.0000	0.0000	0.0000	152.1595	412.7036	662.3840 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2808.4319
Space heating per m2												(98c) / (4) = 32.2697 (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	638.7698	445.8882	323.2761	136.0630	37.1877	0.0000	0.0000	0.0000	0.0000	152.1595	412.7036	662.3840 (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)	692.0582	483.0858	350.2450	147.4139	40.2900	0.0000	0.0000	0.0000	0.0000	164.8532	447.1328	717.6425 (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	233.9158	206.7749	219.7231	193.6279	187.9234	169.6067	167.7261	174.3263	176.1425	196.0560	207.9783	231.4486 (64)
Efficiency of water heater	86.1943	85.7365	84.9243	83.2835	81.1588	79.8000	79.8000	79.8000	79.8000	83.4979	85.5664	86.2803 (217)
Fuel for water heating, kWh/month	271.3819	241.1748	258.7281	232.4924	231.5502	212.5397	210.1830	218.4540	220.7299	234.8034	243.0609	268.2520 (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	24.4718	19.6322	17.6766	12.9506	10.0034	8.1729	9.1255	11.8616	15.4071	20.2149	22.8327	25.1519 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-9.5621	-14.8025	-23.3346	-28.8530	-33.4960	-32.1504	-31.7562	-28.7683	-23.9787	-18.0063	-10.9693	-8.1202 (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)

Full SAP Calculation Printout



Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-2.0223	-4.4315	-9.1545	-14.2824	-19.4289	-19.7300	-19.5036	-16.2640	-11.5974	-6.5099	-2.7527	-1.5867 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3042.7214 (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												2843.3503 (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)												197.5012 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-391.0614 (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												5778.5115 (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	3042.7214	0.2100	638.9715 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2843.3503	0.2100	597.1036 (264)
Space and water heating			1236.0751 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	197.5012	0.1443	28.5055 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-263.7976	0.1327	-35.0039
PV Unit electricity exported	-127.2638	0.1248	-15.8820
Total			-50.8860 (269)
Total CO2, kg/year			1225.6239 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0800 (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	3042.7214	1.1300	3438.2752 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2843.3503	1.1300	3212.9859 (278)
Space and water heating			6651.2611 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	197.5012	1.5338	302.9339 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-263.7976	1.4903	-393.1374
PV Unit electricity exported	-127.2638	0.4580	-58.2910
Total			-451.4284 (283)
Total Primary energy kWh/year			6632.8674 (286)
Target Primary Energy Rate (TPER)			76.2100 (287)

Full SAP Calculation Printout



Property Reference	Unit 9			Issued on Date	23/04/2025
Assessment Reference	B1-9-9-1B1P	Prop Type Ref	B1-9-9-1B1P		
Property					
SAP Rating	81 B	DER	6.10	TER	17.15
Environmental	96 A	% DER < TER			64.43
CO ₂ Emissions (t/year)	0.23	DFEE	39.31	TFEE	40.03
Compliance Check	See BREL	% DFEE < TFEE			1.78
% DPER < TPER	32.42	DPER	63.15	TPER	93.45
Assessor Details	Mr. Callum MacGillivray			Assessor ID	U682-0001
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	47.7700 (1b)	2.4000 (2b)	114.6480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	114.6480 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3026	0.2994	0.2962	0.2802	0.2771	0.2611	0.2611	0.2579	0.2675	0.2771	0.2834	0.2898 (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							
Window			11.3625	1.1450	13.0076		(27)
Wall 1	33.4560	11.3625	22.0935	0.1500	3.3140	190.0000	4197.7652 (29a)
Shelt wall 1	15.1680		15.1680	0.1500	2.2752	190.0000	2881.9200 (29a)
HLR	47.7700		47.7700	0.1000	4.7770	9.0000	429.9300 (30)
Total net area of external elements Aum(A, m ²)			96.3915				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.3739		(33)
Main dwelling							
Party wall 1			18.3600	0.0000	0.0000	180.0000	3304.8001 (32)
Party floor 1			47.7700			40.0000	1910.8000 (32d)
Internal Wall 1			44.5700			75.0000	3342.7500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 16067.9654 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							336.3610 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)								5.0500	0.0500	0.2525		
E4 Jamb								13.5000	0.0500	0.6750		
E7 Party floor between dwellings (in blocks of flats)								20.2600	0.0700	1.4182		
E14 Flat roof								6.3200	0.0800	0.5056		
E15 Flat roof with parapet								13.9400	0.5600	7.8064		
E16 Corner (normal)								4.8000	0.0900	0.4320		
E18 Party wall between dwellings								2.4000	0.0600	0.1440		
E25 Staggered party wall between dwellings								2.4000	0.0600	0.1440		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)								7.6500	0.0000	0.0000		
P4 Party wall - Roof (insulation at ceiling level)								7.6500	0.1200	0.9180		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											12.2957	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	35.6696 (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	11.4471	11.3265	11.2059	10.6029	10.4823	9.8794	9.8794	9.7588	10.1206	10.4823	10.7235	10.9647 (38)
Average = Sum(39)m / 12 =	47.1167	46.9961	46.8755	46.2725	46.1519	45.5489	45.5489	45.4283	45.7901	46.1519	46.3931	46.6343 (39)
												46.2423
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9863	0.9838	0.9813	0.9687	0.9661	0.9535	0.9535	0.9510	0.9586	0.9661	0.9712	0.9762 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9680

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.6247 (42)
Hot water usage for mixer showers												
	51.4603	50.6870	49.5600	47.4039	45.8127	44.0382	43.0296	44.1480	45.3740	47.2792	49.4817	51.2631 (42a)
Hot water usage for baths												
	22.2528	21.9224	21.4570	20.5989	19.9563	19.2439	18.8590	19.3212	19.8243	20.5867	21.4625	22.1776 (42b)
Hot water usage for other uses												
	31.2685	30.1315	28.9945	27.8574	26.7204	25.5833	25.5833	26.7204	27.8574	28.9945	30.1315	31.2685 (42c)
Average daily hot water use (litres/day)												96.5025 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	104.9817	102.7408	100.0115	95.8602	92.4894	88.8654	87.4720	90.1895	93.0557	96.8604	101.0757	104.7093 (44)
Energy content (annual)	166.2653	146.3016	153.7139	131.2278	124.5085	109.2704	105.7898	111.6735	114.7470	131.4386	144.0008	163.9495 (45)
Distribution loss (46)m = 0.15 x (45)m												1602.8865
	24.9398	21.9452	23.0571	19.6842	18.6763	16.3906	15.8685	16.7510	17.2120	19.7158	21.6001	24.5924 (46)
Water storage loss:												
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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												
	195.8951	173.0640	183.3437	159.9018	154.1383	137.9444	135.4196	141.3033	143.4210	161.0684	172.6748	193.5793 (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												
	195.8951	173.0640	183.3437	159.9018	154.1383	137.9444	135.4196	141.3033	143.4210	161.0684	172.6748	193.5793 (64)
12Total per year (kWh/year)												1951.7535 (64)
Electric shower(s)												1952 (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 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	55.2832	48.6453	51.1099	43.6332	41.3991	36.3324	35.1751	37.1314	38.1534	43.7033	47.8803	54.5132 (65)

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

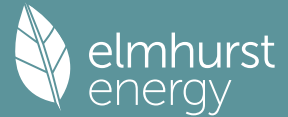
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	71.3427	78.9866	71.3427	73.7208	71.3427	73.7208	71.3427	71.3427	73.7208	71.3427	73.7208	71.3427 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	141.4450	142.9127	139.2140	131.3399	121.4003	112.0585	105.8175	104.3498	108.0485	115.9226	125.8622	135.2040 (68)
Pumps, fans	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879 (71)
Total internal gains	74.3054	72.3888	68.6961	60.6017	55.6439	50.4617	47.2783	49.9078	52.9908	58.7410	66.5004	73.2704 (72)
	334.4636	341.6586	326.6233	313.0329	295.7574	283.6114	271.8091	272.9708	282.1306	293.3768	313.4539	327.1877 (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					
Southeast			5.0625	36.7938	0.4000	0.8000	0.7700	41.3070 (77)				
West			6.3000	19.6403	0.4000	0.8000	0.7700	27.4392 (80)				

Solar gains	68.7461	124.0379	184.6692	248.2079	291.6090	294.3840	281.8660	249.4655	207.0519	141.4560	83.6897	57.9148 (83)

Full SAP Calculation Printout



Total gains 403.2097 465.6965 511.2925 561.2408 587.3665 577.9954 553.6751 522.4363 489.1824 434.8329 397.1435 385.1025 (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	94.7292	94.9723	95.2166	96.4574	96.7094	97.9897	97.9897	98.2498	97.4735	96.7094	96.2067	95.7091
alpha	7.3153	7.3315	7.3478	7.4305	7.4473	7.5326	7.5326	7.5500	7.4982	7.4473	7.4138	7.3806
util living area	0.9963	0.9889	0.9663	0.8803	0.7103	0.5029	0.3619	0.3998	0.6370	0.9204	0.9893	0.9973 (86)
MIT	20.3049	20.4653	20.6647	20.8809	20.9782	20.9985	20.9999	20.9998	20.9922	20.8556	20.5442	20.2781 (87)
Th 2	20.0947	20.0969	20.0990	20.1095	20.1117	20.1223	20.1223	20.1244	20.1180	20.1117	20.1074	20.1032 (88)
util rest of house	0.9948	0.9844	0.9535	0.8439	0.6504	0.4347	0.2897	0.3238	0.5600	0.8858	0.9842	0.9962 (89)
MIT 2	19.4755	19.6351	19.8281	20.0280	20.1004	20.1218	20.1222	20.1243	20.1150	20.0142	19.7228	19.4561 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.0076	20.1678	20.3649	20.5752	20.6636	20.6843	20.6854	20.6860	20.6778	20.5540	20.2498	19.9835 (92)
Temperature adjustment	0.3000											
adjusted MIT	20.3076	20.4678	20.6649	20.8752	20.9636	20.9843	20.9854	20.9860	20.9778	20.8540	20.5498	20.2835 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9952	0.9864	0.9620	0.8757	0.7079	0.5017	0.3607	0.3985	0.6352	0.9154	0.9870	0.9964 (94)
Useful gains	401.2769	459.3804	491.8632	491.4683	415.8066	289.9772	199.6892	208.2146	310.7064	398.0513	391.9609	383.7297 (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	754.2268	731.6236	663.9848	554.1228	427.5343	290.7973	199.7482	208.3358	314.9360	473.2437	623.9785	750.0408 (97)
Space heating kWh	262.5947	182.9474	128.0585	45.1112	8.7254	0.0000	0.0000	0.0000	0.0000	55.9432	167.0527	272.5355 (98a)
Space heating requirement - total per year (kWh/year)	1122.9686											
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	262.5947	182.9474	128.0585	45.1112	8.7254	0.0000	0.0000	0.0000	0.0000	55.9432	167.0527	272.5355 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1122.9686											
Space heating per m2	(98c) / (4) = 23.5078 (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)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (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	262.5947	182.9474	128.0585	45.1112	8.7254	0.0000	0.0000	0.0000	0.0000	55.9432	167.0527	272.5355 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	262.5947	182.9474	128.0585	45.1112	8.7254	0.0000	0.0000	0.0000	0.0000	55.9432	167.0527	272.5355 (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)
Space heating fuel used, main system 2	0.0000 (213)											
Water heating												
Water heating requirement	195.8951	173.0640	183.3437	159.9018	154.1383	137.9444	135.4196	141.3033	143.4210	161.0684	172.6748	193.5793 (64)
Efficiency of water heater (217)m	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800	338.5800 (216)
Fuel for water heating, kWh/month	57.8579	51.1146	54.1508	47.2272	45.5249	40.7420	39.9963	41.7341	42.3596	47.5717	50.9997	57.1739 (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	10.4776	9.4637	10.4776	10.1397	10.4776	10.1397	10.4776	10.4776	10.1397	10.4776	10.1397	10.4776 (231)
Lighting	14.2513	11.4329	10.2941	7.5419	5.8256	4.7595	5.3143	6.9077	8.9724	11.7723	13.2968	14.6474 (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	1122.9686 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	338.5800											
Water heating fuel used	576.4527 (219)											
Space cooling fuel	0.0000 (221)											

Full SAP Calculation Printout



Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)	
mechanical ventilation fans (SFP = 0.8820)	123.3658 (230a)
Total electricity for the above, kWh/year	123.3658 (231)
Electricity for lighting (calculated in Appendix L)	115.0162 (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	1937.8033 (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	1122.9686	0.1572	176.5266 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	576.4527	0.1411	81.3178 (264)
Space and water heating			257.8444 (265)
Pumps, fans and electric keep-hot	123.3658	0.1387	17.1124 (267)
Energy for lighting	115.0162	0.1443	16.6004 (268)
Total CO2, kg/year			291.5572 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.1000 (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	1122.9686	1.5819	1776.4561 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	576.4527	1.5216	877.1412 (278)
Space and water heating			2653.5973 (279)
Pumps, fans and electric keep-hot	123.3658	1.5128	186.6278 (281)
Energy for lighting	115.0162	1.5338	176.4157 (282)
Total Primary energy kWh/year			3016.6408 (286)
Dwelling Primary energy Rate (DPER)			63.1500 (287)

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

1. Overall dwelling characteristics

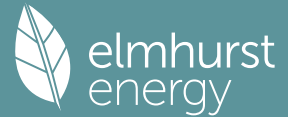
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	47.7700 (1b)	x 2.4000 (2b)	= 114.6480 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.7700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	114.6480 (5)

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) = 0.1744 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4244 (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) = 0.3608 (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	0.4600	0.4510	0.4420	0.3969	0.3878	0.3427	0.3427	0.3337	0.3608	0.3878	0.4059	0.4239 (22b)
Effective ac	0.6058	0.6017	0.5977	0.5787	0.5752	0.5587	0.5587	0.5557	0.5651	0.5752	0.5824	0.5899 (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 Opening Type			11.3625	1.1450	13.0076			(27)
Wall 1	33.4560	11.3625	22.0935	0.1800	3.9768			(29a)
Shelt wall 1	15.1680		15.1680	0.1800	2.7302			(29a)
HLR	47.7700		47.7700	0.1100	5.2547			(30)
Total net area of external elements Aum(A, m2)			96.3915					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.9694			(33)
Main dwelling								
Party wall 1			18.3600	0.0000	0.0000			(32)

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

336.3610 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	5.0500	0.0500	0.2525	
E2 Other lintels (including other steel lintels)	13.5000	0.0500	0.6750	
E4 Jamb	20.2600	0.0700	1.4182	
E7 Party floor between dwellings (in blocks of flats)	6.3200	0.0800	0.5056	
E14 Flat roof	13.9400	0.5600	7.8064	
E15 Flat roof with parapet	4.8000	0.0900	0.4320	
E16 Corner (normal)	2.4000	0.0600	0.1440	
E18 Party wall between dwellings	2.4000	0.0600	0.1440	
E25 Staggered party wall between dwellings	7.6500	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.6500	0.1200	0.9180	
P4 Party wall - Roof (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				12.2957 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 37.2651 (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	22.9196	22.7642	22.6119	21.8963	21.7624	21.1391	21.1391	21.0237	21.3792	21.7624	22.0332	22.3164	(38)
Heat transfer coeff	60.1847	60.0293	59.8770	59.1614	59.0275	58.4042	58.4042	58.2888	58.6443	59.0275	59.2983	59.5815	(39)
Average = Sum(39)m / 12 =													59.1607
HLP	1.2599	1.2566	1.2534	1.2385	1.2357	1.2226	1.2226	1.2202	1.2276	1.2357	1.2413	1.2473	(40)
HLP (average)													1.2384
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

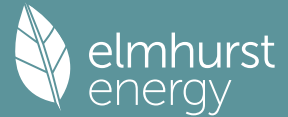
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6247 (42)
Hot water usage for mixer showers	51.4603	50.6870	49.5600	47.4039	45.8127	44.0382	43.0296	44.1480	45.3740	47.2792	49.4817	51.2631	(42a)
Hot water usage for baths	22.2528	21.9224	21.4570	20.5989	19.9563	19.2439	18.8590	19.3212	19.8243	20.5867	21.4625	22.1776	(42b)
Hot water usage for other uses	31.2685	30.1315	28.9945	27.8574	26.7204	25.5833	25.5833	26.7204	27.8574	28.9945	30.1315	31.2685	(42c)
Average daily hot water use (litres/day)													96.5025 (43)
Daily hot water use	104.9817	102.7408	100.0115	95.8602	92.4894	88.8654	87.4720	90.1895	93.0557	96.8604	101.0757	104.7093	(44)
Energy conte	166.2653	146.3016	153.7139	131.2278	124.5085	109.2704	105.7898	111.6735	114.7470	131.4386	144.0008	163.9495	(45)
Energy content (annual)										Total = Sum(45)m =			1602.8865
Distribution loss (46)m = 0.15 x (45)m	24.9398	21.9452	23.0571	19.6842	18.6763	16.3906	15.8685	16.7510	17.2120	19.7158	21.6001	24.5924	(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	212.8602	188.3873	200.3088	176.3196	171.1034	154.3622	152.3847	158.2684	159.8388	178.0335	189.0926	210.5444	(62)
WWHRS	-23.5255	-20.8061	-21.7870	-18.0405	-16.8131	-14.3871	-13.4856	-14.3406	-14.8854	-17.5483	-19.8801	-23.0898	(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	189.3347	167.5811	178.5218	158.2791	154.2903	139.9751	138.8991	143.9278	144.9534	160.4852	169.2126	187.4545	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			1932.9148 (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	92.5591	82.3138	88.3858	79.7067	78.6750	72.4059	72.4510	74.4074	74.2268	80.9793	83.9537	91.7891	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	81.2349	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	71.3427	78.9866	71.3427	73.7208	71.3427	73.7208	71.3427	71.3427	73.7208	71.3427	73.7208	71.3427	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.4450	142.9127	139.2140	131.3399	121.4003	112.0585	105.8175	104.3498	108.0485	115.9226	125.8622	135.2040	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	31.1235	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	-64.9879	(71)
Water heating gains (Table 5)	124.4075	122.4908	118.7981	110.7038	105.7460	100.5637	97.3804	100.0099	103.0928	108.8431	116.6024	123.3725	(72)

Full SAP Calculation Printout



Total internal gains
387.5656 394.7606 379.7253 366.1350 348.8595 333.7135 321.9111 323.0729 332.2326 346.4789 366.5559 380.2897 (73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast	5.0625				36.7938	0.6300		0.7000	0.7700	56.9262 (77)
West	6.3000				19.6403	0.6300		0.7000	0.7700	37.8146 (80)
Solar gains	94.7408	170.9397	254.4972	342.0615	401.8737	405.6979	388.4466	343.7946	285.3433	194.9441 115.3348 79.8138 (83)
Total gains	482.3064	565.7003	634.2225	708.1965	750.7332	739.4114	710.3577	666.8675	617.5760	541.4230 481.8907 460.1035 (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	74.1604	74.3524	74.5416	75.4432	75.6143	76.4213	76.4213	76.5726	76.1084	75.6143	75.2690	74.9112	
alpha	5.9440	5.9568	5.9694	6.0295	6.0410	6.0948	6.0948	6.1048	6.0739	6.0410	6.0179	5.9941	
util living area	0.9933	0.9825	0.9534	0.8623	0.6979	0.5016	0.3613	0.4011	0.6370	0.9058	0.9832	0.9949 (86)	
MIT	20.0872	20.2870	20.5423	20.8169	20.9564	20.9949	20.9994	20.9989	20.9804	20.7851	20.3902	20.0556 (87)	
Th 2	19.8724	19.8750	19.8775	19.8894	19.8916	19.9020	19.9020	19.9039	19.8980	19.8916	19.8871	19.8824 (88)	
util rest of house	0.9905	0.9755	0.9357	0.8186	0.6272	0.4176	0.2714	0.3061	0.5439	0.8635	0.9751	0.9927 (89)	
MIT 2	18.8492	19.1017	19.4149	19.7321	19.8633	19.8999	19.9018	19.9036	19.8887	19.7107	19.2433	18.8169 (90)	
Living area fraction	fLA = Living area / (4) =												0.6416 (91)
MIT	19.6435	19.8622	20.1382	20.4281	20.5647	20.6025	20.6061	20.6064	20.5891	20.4000	19.9792	19.6117 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.6435	19.8622	20.1382	20.4281	20.5647	20.6025	20.6061	20.6064	20.5891	20.4000	19.9792	19.6117 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9898	0.9754	0.9404	0.8411	0.6711	0.4715	0.3291	0.3672	0.6033	0.8847	0.9760	0.9920 (94)
Useful gains	477.4024	551.8076	596.3978	595.6595	503.8171	348.6101	233.7906	244.8405	372.5763	479.0149	470.3025	456.4264 (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	923.4468	898.1724	816.6152	682.0205	523.2595	350.5711	233.9710	245.1856	380.5504	578.4699	763.7146	918.2497 (97)
Space heating kWh	331.8570	232.7571	163.8418	62.1799	14.4651	0.0000	0.0000	0.0000	0.0000	73.9945	211.2567	343.5966 (98a)
Space heating requirement - total per year (kWh/year)												1433.9487
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	331.8570	232.7571	163.8418	62.1799	14.4651	0.0000	0.0000	0.0000	0.0000	73.9945	211.2567	343.5966 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1433.9487
Space heating per m2												(98c) / (4) = 30.0178 (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	331.8570	232.7571	163.8418	62.1799	14.4651	0.0000	0.0000	0.0000	0.0000	73.9945	211.2567	343.5966 (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)	359.5417	252.1746	177.5100	67.3672	15.6719	0.0000	0.0000	0.0000	0.0000	80.1674	228.8805	372.2606 (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	189.3347	167.5811	178.5218	158.2791	154.2903	139.9751	138.8991	143.9278	144.9534	160.4852	169.2126	187.4545 (64)
Efficiency of water heater	85.3050	84.7967	83.8678	82.1483	80.4993	79.8000	79.8000	79.8000	79.8000	82.4366	84.5586	79.8000 (216)
Fuel for water heating, kWh/month	221.9503	197.6269	212.8609	192.6749	191.6666	175.4075	174.0590	180.3606	181.6459	194.6772	200.1128	219.5013 (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	14.8236	11.8921	10.7075	7.8448	6.0595	4.9507	5.5277	7.1851	9.3327	12.2451	13.8308	15.2356 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-5.3179	-8.2718	-13.1042	-16.2916	-19.0018	-18.2813	-18.0672	-16.3296	-13.5504	-10.1057	-6.1165	-4.5124 (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	-1.0407	-2.2856	-4.7287	-7.3851	-10.0482	-10.1954	-10.0688	-8.3882	-5.9770	-3.3510	-1.4153	-0.8157 (233b)

Full SAP Calculation Printout



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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1553.5739	(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													2342.5438	(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)													119.6350	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-214.6502	(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													3887.1026	(238)

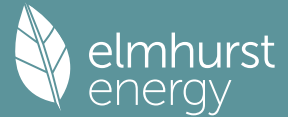
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1553.5739	0.2100	326.2505 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2342.5438	0.2100	491.9342 (264)
Space and water heating			818.1847 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	119.6350	0.1443	17.2670 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-148.9503	0.1326	-19.7479
PV Unit electricity exported	-65.6999	0.1248	-8.1989
Total			-27.9468 (269)
Total CO2, kg/year			819.4342 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.1500 (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	1553.5739	1.1300	1755.5385 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2342.5438	1.1300	2647.0745 (278)
Space and water heating			4402.6131 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	119.6350	1.5338	183.5002 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-148.9503	1.4899	-221.9181
PV Unit electricity exported	-65.6999	0.4580	-30.0919
Total			-252.0100 (283)
Total Primary energy kWh/year			4464.2041 (286)
Target Primary Energy Rate (TPER)			93.4500 (287)

Full SAP Calculation Printout



Property Reference	Unit 10				Issued on Date	23/04/2025	
Assessment Reference	B1-9-2-2B4P			Prop Type Ref	B1-9-2-2B4P		
Property							
SAP Rating	83 B		DER	4.78		TER	13.31
Environmental	96 A		% DER < TER				64.09
CO ₂ Emissions (t/year)	0.27		DFEE	31.20		TFEE	31.22
Compliance Check	See BREL		% DFEE < TFEE				0.06
% DPER < TPER	31.51		DPER	49.50		TPER	72.28
Assessor Details	Mr. Callum MacGillivray					Assessor ID	U682-0001
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	69.6300 (1b)	2.4000 (2b)	167.1120 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.6300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	167.1120 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)

	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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												71.2000 (23c)
Effective ac	0.3066	0.3034	0.3002	0.2843	0.2811	0.2651	0.2651	0.2619	0.2715	0.2811	0.2874	0.2938 (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							
Window			15.1875	1.1450	17.4046		(27)
Wall 1	36.1200	15.1875	20.9325	0.1500	3.1399	190.0000	3977.1748 (29a)
HLR	69.6300		69.6300	0.1000	6.9630	9.0000	626.6700 (30)
Total net area of external elements A _{um} (A, m ²)			105.7625				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.5075		(33)
Main dwelling							
Party wall 1			45.0000	0.0000	0.0000	180.0000	8100.0000 (32)
Party floor 1			69.6300			40.0000	2785.2000 (32d)
Internal Wall 1			44.5700			75.0000	3342.7500 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	18831.7948 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							270.4552 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.7500	0.0500	0.3375	

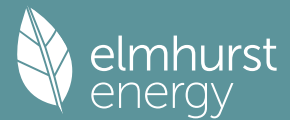
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	16.9060	16.7302	16.5544	15.6755	15.4997	14.6208	14.6208	14.4451	14.9724	15.4997	15.8513	16.2029 (38)
Heat transfer coeff	58.1114	57.9357	57.7599	56.8810	56.7052	55.8263	55.8263	55.6505	56.1779	56.7052	57.0568	57.4083 (39)
Average = Sum(39)m / 12 =												56.8370
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8346	0.8321	0.8295	0.8169	0.8144	0.8018	0.8018	0.7992	0.8068	0.8144	0.8194	0.8245 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

[illegible]

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554	111.8554 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.0774	109.6928	99.0774	102.3799	99.0774	102.3799	99.0774	99.0774	102.3799	99.0774	102.3799	99.0774 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.4320	198.4703	193.3337	182.3986	168.5949	155.6214	146.9543	144.9160	150.0525	160.9877	174.7914	187.7649 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855 (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)	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843 (71)
Water heating gains (Table 5)	89.1377	86.8381	82.4079	72.6979	66.7504	60.5337	56.7153	59.8699	63.5685	70.4666	79.7747	87.8962 (72)
Total internal gains	441.2037	451.5578	431.3756	414.0331	390.9793	375.0917	359.3036	360.4198	372.5576	387.0882	413.5026	431.2951 (73)

Page 2 of 7

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	90.0176	90.2907	90.5655	91.9649	92.2500	93.7023	93.7023	93.9983	93.1159	92.2500	91.6816	91.1201	
alpha	7.0012	7.0194	7.0377	7.1310	7.1500	7.2468	7.2468	7.2666	7.2077	7.1500	7.1121	7.0747	
util living area	0.9924	0.9784	0.9430	0.8342	0.6593	0.4632	0.3328	0.3661	0.5826	0.8782	0.9792	0.9944 (86)	
MIT	20.3389	20.5162	20.7140	20.9079	20.9838	20.9989	20.9999	20.9998	20.9946	20.8881	20.5882	20.3099 (87)	
Th 2	20.2235	20.2256	20.2278	20.2387	20.2409	20.2518	20.2518	20.2540	20.2474	20.2409	20.2365	20.2322 (88)	
util rest of house	0.9901	0.9721	0.9275	0.7996	0.6102	0.4095	0.2762	0.3068	0.5214	0.8427	0.9720	0.9925 (89)	
MIT 2	19.6293	19.8043	19.9937	20.1731	20.2316	20.2514	20.2518	20.2540	20.2450	20.1630	19.8856	19.6081 (90)	
Living area fraction									fLA = Living area / (4) =				0.5347 (91)
MIT	20.0087	20.1850	20.3788	20.5660	20.6338	20.6510	20.6518	20.6528	20.6458	20.5507	20.2613	19.9833 (92)	
Temperature adjustment												0.3000	
adjusted MIT	20.3087	20.4850	20.6788	20.8660	20.9338	20.9510	20.9518	20.9528	20.9458	20.8507	20.5613	20.2833 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9904	0.9744	0.9370	0.8284	0.6551	0.4597	0.3291	0.3624	0.5782	0.8718	0.9754	0.9927 (94)
Useful gains	536.7937	613.8494	646.4275	623.8543	513.5157	353.8596	242.8929	253.2622	381.2517	513.0514	522.3660	512.9050 (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	930.2899	902.9247	818.9678	680.6351	523.6043	354.5551	242.9448	253.3636	384.5832	581.2685	768.0581	923.3168 (97)
Space heating kWh	292.7611	194.2586	128.3700	40.8822	7.5059	0.0000	0.0000	0.0000	0.0000	50.7536	176.8983	305.3463 (98a)
Space heating requirement - total per year (kWh/year)												1196.7760
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	292.7611	194.2586	128.3700	40.8822	7.5059	0.0000	0.0000	0.0000	0.0000	50.7536	176.8983	305.3463 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1196.7760
Space heating per m2										(98c) / (4) =		17.1877 (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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (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	292.7611	194.2586	128.3700	40.8822	7.5059	0.0000	0.0000	0.0000	0.0000	50.7536	176.8983	305.3463	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	292.7611	194.2586	128.3700	40.8822	7.5059	0.0000	0.0000	0.0000	0.0000	50.7536	176.8983	305.3463	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	229.0838	202.2667	214.0252	186.0951	178.9901	159.7545	156.5355	163.5942	166.3260	187.3053	201.4192	226.3058	(64)
Efficiency of water heater	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	337.7338	(216)
Fuel for water heating, kWh/month	67.8297	59.8894	63.3710	55.1011	52.9974	47.3019	46.3488	48.4388	49.2477	55.4595	59.6384	67.0072	(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	14.7875	13.3564	14.7875	14.3105	14.7875	14.3105	14.7875	14.7875	14.3105	14.7875	14.3105	14.7875	(231)
Lighting	21.3809	17.1525	15.4439	11.3149	8.7399	7.1406	7.9729	10.3634	13.4611	17.6617	19.9488	21.9751	(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												1196.7760	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												337.7338	
Water heating fuel used												672.6309	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8540)													
mechanical ventilation fans (SFP = 0.8540)												174.1107	(230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	174.1107	(231)
Electricity for lighting (calculated in Appendix L)	172.5557	(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	2216.0733	(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	1196.7760	0.1576	188.6646 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	672.6309	0.1411	94.9338 (264)
Space and water heating			283.5984 (265)
Pumps, fans and electric keep-hot	174.1107	0.1387	24.1513 (267)
Energy for lighting	172.5557	0.1443	24.9051 (268)
Total CO2, kg/year			332.6548 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7800 (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	1196.7760	1.5836	1895.1689 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	672.6309	1.5219	1023.6695 (278)
Space and water heating			2918.8384 (279)
Pumps, fans and electric keep-hot	174.1107	1.5128	263.3946 (281)
Energy for lighting	172.5557	1.5338	264.6717 (282)
Total Primary energy kWh/year			3446.9048 (286)
Dwelling Primary energy Rate (DPER)			49.5000 (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	69.6300	2.4000	167.1120
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.6300		167.1120
Dwelling volume			167.1120

2. Ventilation rate

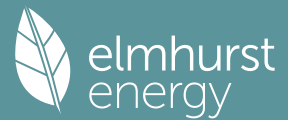
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) =	0.1197 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3697	(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) =		0.3142 (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	0.4006	0.3928	0.3849	0.3457	0.3378	0.2985	0.2985	0.2907	0.3142	0.3378	0.3535	0.3692 (22b)
Effective ac	0.5803	0.5771	0.5741	0.5597	0.5571	0.5446	0.5446	0.5422	0.5494	0.5571	0.5625	0.5682 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout

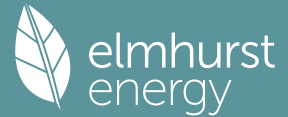


Element			Gross m2	Openings m2	NetArea m2		U-value W/m2K	A x U W/K		K-value kJ/m2K	A x K kJ/K			
Main dwelling	TER Opening Type				15.1875	1.1450	17.4046				(27)			
	Wall 1		36.1200	15.1875	20.9325	0.1800	3.7678				(29a)			
	HLR		69.6300		69.6300	0.1100	7.6593				(30)			
Total net area of external elements Aum(A, m2)					105.7625							(31)		
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =					28.8317	(33)			
Main dwelling	Party wall 1				45.0000	0.0000	0.0000				(32)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											270.4552	(35)		
List of Thermal Bridges														
										Length	Psi-value	Total		
K1 Element										6.7500	0.0500	0.3375		
E2 Other lintels (including other steel lintels)										22.5000	0.0500	1.1250		
E4 Jamb										15.0500	0.0700	1.0535		
E7 Party floor between dwellings (in blocks of flats)										15.0500	0.5600	8.4280		
E15 Flat roof with parapet										2.4000	0.0900	0.2160		
E16 Corner (normal)										4.8000	0.0600	0.2880		
E18 Party wall between dwellings										18.7500	0.0000	0.0000		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)										18.7500	0.1200	2.2500		
P4 Party wall - Roof (insulation at ceiling level)														
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											13.6980	(36)		
Point Thermal bridges											(36a) =	0.0000		
Total fabric heat loss											(33) + (36) + (36a) =	42.5297	(37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)	
Heat transfer coeff	31.9994	31.8275	31.6591	30.8678	30.7198	30.0306	30.0306	29.9030	30.2961	30.7198	31.0193	31.3324	(38)	
	74.5291	74.3573	74.1888	73.3975	73.2495	72.5603	72.5603	72.4327	72.8258	73.2495	73.5490	73.8621	(39)	
Average = Sum(39)m / 12 =													73.3968	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	1.0704	1.0679	1.0655	1.0541	1.0520	1.0421	1.0421	1.0403	1.0459	1.0520	1.0563	1.0608	(40)	
HLP (average)													1.0541	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)													-----	
Assumed occupancy													2.2371	(42)
Hot water usage for mixer showers														
	61.7286	60.8009	59.4492	56.8628	54.9541	52.8255	51.6156	52.9572	54.4278	56.7132	59.3552	61.4921	(42a)	
Hot water usage for baths														
	26.6685	26.2725	25.7147	24.6864	23.9163	23.0625	22.6013	23.1551	23.7581	24.6718	25.7213	26.5784	(42b)	
Hot water usage for other uses														
	37.5402	36.1751	34.8100	33.4449	32.0798	30.7147	30.7147	32.0798	33.4449	34.8100	36.1751	37.5402	(42c)	
Average daily hot water use (litres/day)													115.7651	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	125.9374	123.2485	119.9739	114.9940	110.9502	106.6027	104.9316	108.1921	111.6308	116.1950	121.2516	125.6107	(44)	
Energy conte	199.4540	175.5043	184.3954	157.4211	149.3603	131.0805	126.9057	133.9644	137.6520	157.6755	172.7452	196.6760	(45)	
Energy content (annual)											Total = Sum(45)m =	1922.8345		
Distribution loss (46)m = 0.15 x (45)m														
	29.9181	26.3256	27.6593	23.6132	22.4040	19.6621	19.0359	20.0947	20.6478	23.6513	25.9118	29.5014	(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	(59)
Combi loss													0.0000	(61)
Total heat required for water heating calculated for each month														
	246.0489	217.5900	230.9903	202.5129	195.9552	176.1723	173.5006	180.5594	182.7438	204.2704	217.8370	243.2709	(62)	
WWHRS													-27.6971	(63a)
PV diverter													-0.0000	(63b)
Solar input													0.0000	(63c)
FGHRS													0.0000	(63d)
Output from w/h														
	217.8292	192.6322	204.8560	180.8727	175.7873	158.9145	157.3241	163.3573	164.8882	183.2206	193.9901	215.5738	(64)	
12Total per year (kWh/year)											Total per year (kWh/year) = Sum(64)m =	2209.2459	(64)	
Electric shower(s)													2209	(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	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
	103.5944	92.0237	98.5874	88.4160	86.9382	79.6577	79.4721	81.8191	81.8428	89.7030	93.5112	102.6707	(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	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	99.1418	109.7642	99.1418	102.4466	99.1418	102.4466	99.1418	99.1418	102.4466	99.1418	102.4466	99.1418	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	196.4320	198.4703	193.3337	182.3986	168.5949	155.6214	146.9543	144.9160	150.0525	160.9877	174.7914	187.7649	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	34.1855	(69)	
Pumps, fans													3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)														
	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	-89.4843	(71)	
Water heating gains (Table 5)														
	139.2398	136.9401	132.5100	122.8000	116.8525	110.6357	106.8173	109.9719	113.6705	120.5686	129.8767	137.9982	(72)	
Total internal gains														
	494.3702	504.7312	484.5421	467.2017	444.1458	425.2603	409.4701	410.5863	422.7262	440.2547	466.6713	484.4616	(73)	

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southwest	9.1125				36.7938	0.6300	0.7000	0.7000	0.7700	102.4671 (79)
West	6.0750				19.6403	0.6300	0.7000	0.7000	0.7700	36.4641 (80)
Solar gains	138.9312	245.8709	356.2852	467.2272	541.4006	543.9754	521.8569	466.4919	395.2090	117.6768 (83)
Total gains	633.3014	750.6021	840.8273	934.4290	985.5464	969.2357	931.3270	877.0783	717.9353	602.1383 (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	70.1881	70.3503	70.5100	71.2702	71.4142	72.0925	72.0925	72.2195	71.8297	71.4142	71.1234	70.8219
alpha	5.6792	5.6900	5.7007	5.7513	5.7609	5.8062	5.8062	5.8146	5.7886	5.7609	5.7416	5.7215
util living area	0.9893	0.9726	0.9337	0.8294	0.6635	0.4756	0.3424	0.3790	0.5997	0.8762	0.9744	0.9917 (86)
MIT	20.0939	20.3149	20.5735	20.8337	20.9598	20.9950	20.9994	20.9989	20.9824	20.8046	20.4067	20.0547 (87)
Th 2	20.0251	20.0271	20.0291	20.0385	20.0402	20.0484	20.0484	20.0499	20.0453	20.0402	20.0367	20.0330 (88)
util rest of house	0.9858	0.9643	0.9149	0.7895	0.6043	0.4066	0.2686	0.3012	0.5230	0.8357	0.9651	0.9890 (89)
MIT 2	18.9949	19.2725	19.5877	19.8880	20.0112	20.0460	20.0482	20.0496	20.0354	19.8674	19.3979	18.9515 (90)
Living area fraction	19.5825	19.8299	20.1148	20.3937	20.5184	20.5534	20.5568	20.5572	20.5417	20.3685	19.9373	19.5414 (92)
Temperature adjustment	19.5825	19.8299	20.1148	20.3937	20.5184	20.5534	20.5568	20.5572	20.5417	20.3685	19.9373	0.0000
adjusted MIT	19.5825	19.8299	20.1148	20.3937	20.5184	20.5534	20.5568	20.5572	20.5417	20.3685	19.9373	19.5414 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9838	0.9623	0.9167	0.8051	0.6344	0.4434	0.3080	0.3429	0.5635	0.8507	0.9640	0.9872 (94)
Useful gains	623.0687	722.3184	770.8107	752.2681	625.2362	429.7768	286.8926	300.7205	460.9271	610.6629	611.9950	594.4524 (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	1138.9917	1110.1444	1010.0653	843.6057	645.9458	431.9809	287.1069	301.1156	469.1248	715.5372	944.1696	1133.1480 (97)
Space heating kWh	383.8467	260.6191	178.0055	65.7631	15.4079	0.0000	0.0000	0.0000	0.0000	78.0265	239.1657	400.7895 (98a)
Space heating requirement - total per year (kWh/year)												1621.6240
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	383.8467	260.6191	178.0055	65.7631	15.4079	0.0000	0.0000	0.0000	0.0000	78.0265	239.1657	400.7895 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1621.6240
Space heating per m2										(98c) / (4) =		23.2892 (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	383.8467	260.6191	178.0055	65.7631	15.4079	0.0000	0.0000	0.0000	0.0000	78.0265	239.1657	400.7895	(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)	415.8686	282.3609	192.8553	71.2493	16.6933	0.0000	0.0000	0.0000	0.0000	84.5357	259.1178	434.2249	(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	217.8292	192.6322	204.8560	180.8727	175.7873	158.9145	157.3241	163.3573	164.8882	183.2206	193.9901	215.5738	(64)
Efficiency of water heater	85.3164	84.7383	83.7463	82.0164	80.4571	79.8000	79.8000	79.8000	79.8000	82.2910	84.5304	79.8000	(216)
Fuel for water heating, kWh/month	255.3192	227.3261	244.6151	220.5322	218.4856	199.1409	197.1480	204.7084	206.6268	222.6497	229.4915	252.3392	(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	20.5997	16.5259	14.8797	10.9015	8.4206	6.8797	7.6816	9.9848	12.9693	17.0164	19.2200	21.1722	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-7.6965	-11.9407	-18.8654	-23.3832	-27.2009	-26.1331	-25.8174	-23.3643	-19.4368	-14.5516	-8.8392	-6.5334	(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	-1.5718	-3.4478	-7.1281	-11.1281	-15.1426	-15.3748	-15.1940	-12.6647	-9.0266	-5.0630	-2.1392	-1.2327	(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)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	1756.9057 (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	2678.3827 (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)	166.2515 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-312.8761 (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	4374.6638 (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	1756.9057	0.2100	368.9502 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2678.3827	0.2100	562.4604 (264)
Space and water heating			931.4106 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	166.2515	0.1443	23.9952 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-213.7625	0.1326	-28.3542
PV Unit electricity exported	-99.1136	0.1248	-12.3680
Total			-40.7222 (269)
Total CO2, kg/year			926.6128 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.3100 (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	1756.9057	1.1300	1985.3035 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2678.3827	1.1300	3026.5724 (278)
Space and water heating			5011.8759 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	166.2515	1.5338	255.0021 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-213.7625	1.4901	-318.5310
PV Unit electricity exported	-99.1136	0.4580	-45.3935
Total			-363.9245 (283)
Total Primary energy kWh/year			5033.0542 (286)
Target Primary Energy Rate (TPER)			72.2800 (287)