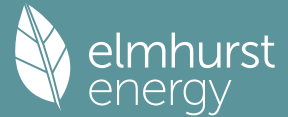


Full SAP Calculation Printout



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	70 C	DER	16.97	TER	21.01	
Environmental	88 B	% DER < TER				19.23
CO ₂ Emissions (t/year)	0.81	DFEE	57.85	TFEE	59.66	
Compliance Check	See BREL	% DFEE < TFEE				3.03
% DPER < TPER	-5.22	DPER	120.00	TPER	114.05	
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		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	179.1800 (5)

2. Ventilation rate

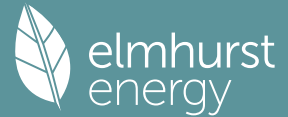
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.3125 (37)

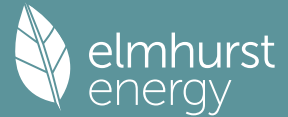
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.8903	17.7019	17.5134	16.5710	16.3825	15.4402	15.4402	15.2517	15.8171	16.3825	16.7595	17.1364	(38)
Heat transfer coeff	61.2028	61.0144	60.8259	59.8835	59.6950	58.7527	58.7527	58.5642	59.1296	59.6950	60.0720	60.4489	(39)
Average = Sum(39)m / 12 =												59.8364	
HLP	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)
HLP (average)												1.1354	
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												
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 baths												
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)
Hot water usage for other uses												
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)
Average daily hot water use (litres/day)												101.0639 (43)
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 conte	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)
Energy content (annual)										Total = Sum(45)m =	1678.6506	
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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss												
1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090	(56)
If cylinder contains dedicated solar storage												
1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090	(57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
230.1910	203.8576	217.0459	191.6884	186.4600	138.1170	135.2614	141.4234	143.8529	193.7181	205.0655	227.7657	(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												
230.1910	203.8576	217.0459	191.6884	186.4600	138.1170	135.2614	141.4234	143.8529	193.7181	205.0655	227.7657	(64)
Total per year (kWh/year)												2214.4472 (64)
Electric shower(s)												2214 (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												
102.7497	91.4572	98.3789	89.1020	88.2091	56.9953	56.4148	58.4637	58.9024	90.6224	93.5499	101.9432	(65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	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	(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)												
138.1044	136.0971	132.2297	123.7528	118.5606	79.1601	75.8264	78.5802	81.8089	121.8043	129.9304	137.0205	(72)
Total internal gains	419.6875	427.6161	411.3801	396.9100	378.2858	331.2915	318.5591	319.7124	329.5676	375.5562	397.1143	411.7981 (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						

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	466.9036	520.4020	566.9828	630.9002	673.0289	636.9469	607.9125	562.6204	512.5988	486.2327	456.0204	450.6284 (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	0.9997	0.9989	0.9946	0.9558	0.7991	0.5890	0.4252	0.4786	0.7767	0.9779	0.9986	0.9998 (86)	
MIT	20.4011	20.5010	20.6567	20.8685	20.9812	20.9990	21.0000	20.9999	20.9893	20.8428	20.5898	20.3898 (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	0.9994	0.9980	0.9904	0.9268	0.7237	0.4968	0.3275	0.3738	0.6735	0.9565	0.9974	0.9996 (89)	
MIT 2	19.4212	19.5233	19.6795	19.8866	19.9668	19.9885	19.9887	19.9916	19.9801	19.8720	19.6245	19.4200 (90)	
Living area fraction									fLA = Living area / (4) =				0.6199 (91)
MIT	20.0287	20.1294	20.2853	20.4953	20.5956	20.6150	20.6156	20.6167	20.6057	20.4738	20.2229	20.0212 (92)	
Temperature adjustment												0.3000	
adjusted MIT	20.3287	20.4294	20.5853	20.7953	20.8956	20.9150	20.9156	20.9167	20.9057	20.7738	20.5229	20.3212 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9995	0.9985	0.9932	0.9510	0.7919	0.5813	0.4170	0.4700	0.7678	0.9743	0.9982	0.9997 (94)
Useful gains	466.6830	519.5957	563.1286	599.9909	532.9764	370.2415	253.5257	264.4309	393.5718	473.7454	455.1869	450.4750 (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	980.9994	947.5165	856.7505	712.3351	548.9338	371.0216	253.5538	264.5153	402.4205	607.3271	806.3395	974.5097 (97)
Space heating kWh	382.6514	287.5628	218.4547	80.8878	11.8724	0.0000	0.0000	0.0000	0.0000	99.3848	252.8299	389.8818 (98a)
Space heating requirement - total per year (kWh/year)												1723.5255
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	382.6514	287.5628	218.4547	80.8878	11.8724	0.0000	0.0000	0.0000	0.0000	99.3848	252.8299	389.8818 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1723.5255
Space heating per m2										(98c) / (4) =		32.7045 (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 %)												83.9000 (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	382.6514	287.5628	218.4547	80.8878	11.8724	0.0000	0.0000	0.0000	0.0000	99.3848	252.8299	389.8818 (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)	382.6514	287.5628	218.4547	80.8878	11.8724	0.0000	0.0000	0.0000	0.0000	99.3848	252.8299	389.8818 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	230.1910	203.8576	217.0459	191.6884	186.4600	138.1170	135.2614	141.4234	143.8529	193.7181	205.0655	227.7657 (64)
Efficiency of water heater (217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	80.3000 (216)
Fuel for water heating, kWh/month	305.6986	270.7272	288.2416	254.5663	247.6229	183.4224	179.6301	187.8133	191.0397	257.2618	272.3313	302.4777 (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	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												1723.5255 (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	80.3000	
Water heating fuel used	2940.8329	(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	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	4982.5843	(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	1723.5255	0.1568	270.1843 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2940.8329	0.2100	617.5749 (264)
Space and water heating			887.7592 (265)
Pumps, fans and electric keep-hot	192.8049	0.1387	26.7444 (267)
Energy for lighting	125.4210	0.1443	18.1021 (268)
Total CO2, kg/year			932.6057 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			17.7000 (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	1723.5255	1.5804	2723.7986 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2940.8329	1.1300	3323.1412 (278)
Space and water heating			6046.9398 (279)
Pumps, fans and electric keep-hot	192.8049	1.5128	291.6752 (281)
Energy for lighting	125.4210	1.5338	192.3750 (282)
Total Primary energy kWh/year			6530.9899 (286)
Dwelling Primary energy Rate (DPER)			123.9300 (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	52.7000 (1b)	x 3.4000 (2b)	= 179.1800 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 179.1800 (5)

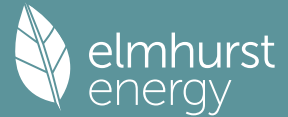
2. Ventilation rate

	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) =	0.1116 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
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)

	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)

Full SAP Calculation Printout



Adj infilt rate	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)
Effective ac	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

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		(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	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)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												78.6923
HLP	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)
HLP (average)												1.4932
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

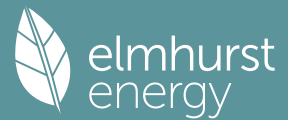
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7697 (42)
Hot water usage for mixer showers													
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 baths													
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)	
Hot water usage for other uses													
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)	
Average daily hot water use (litres/day)												101.0639 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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												180.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8381 (55)	
Total storage loss													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)	
If cylinder contains dedicated solar storage													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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	(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													
223.3671	197.6940	210.2220	185.0846	179.6361	162.0892	160.0327	166.1947	167.8251	186.8942	198.4617	220.9418	(62)	
WWHRS	-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)	
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													
198.7300	175.9048	187.4055	166.1917	162.0286	147.0224	145.9099	151.1765	152.2363	168.5168	177.6423	196.7609 (64)		
12Total per year (kWh/year)												2029.5256 (64)	
Electric shower(s)												2030 (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													
97.2905	86.5264	92.9198	83.8190	82.7500	76.1730	76.2318	78.2807	78.0802	85.1633	88.2668	96.4841 (65)		

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

Metabolic gains (Table 5), Watts												
(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)

Full SAP Calculation Printout



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)	130.7668	128.7595	124.8922	116.4152	111.2231	105.7958	102.4621	105.2160	108.4447	114.4668	122.5928	129.6829 (72)
Total internal gains	415.3500	423.2785	407.0425	392.5724	373.9482	357.9273	345.1948	346.3481	356.2034	371.2186	392.7768	407.4606 (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	480.4196	551.1492	621.4825	715.0403	780.1410	779.1586	743.9601	681.1058	608.4432	523.7447	473.9567			460.9735 (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	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	0.9958	0.9700	0.8539	0.6320	0.4597	0.5231	0.8252	0.9881	0.9991	0.9998 (86)
MIT	20.1244	20.2484	20.4517	20.7341	20.9339	20.9941	20.9995	20.9988	20.9621	20.6921	20.3601	20.1070 (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	0.9983	0.9923	0.9458	0.7701	0.5086	0.3248	0.3771	0.7024	0.9738	0.9982	0.9996 (89)
MIT 2	18.6915	18.8523	19.1128	19.4643	19.6590	19.7035	19.7048	19.7066	19.6876	19.4251	19.0049	18.6770 (90)
Living area fraction	fLA = Living area / (4) = 0.6199 (91)											
MIT	19.5798	19.7178	19.9428	20.2515	20.4493	20.5036	20.5074	20.5077	20.4777	20.2106	19.8450	19.5635 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5798	19.7178	19.9428	20.2515	20.4493	20.5036	20.5074	20.5077	20.4777	20.2106	19.8450	19.5635 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9995	0.9984	0.9932	0.9579	0.8218	0.5857	0.4086	0.4679	0.7805	0.9809	0.9984	0.9996 (94)
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	1220.1515	1180.6462	1068.7715	893.2802	687.1833	459.5007	304.1325	319.1807	498.1381	754.8246	1004.9248	1216.3203 (97)
Space heating kWh	550.5433	423.6229	335.9155	150.0119	34.2845	0.0000	0.0000	0.0000	0.0000	179.3734	382.8601	562.1052 (98a)
Space heating requirement - total per year (kWh/year)	2618.7168											
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	550.5433	423.6229	335.9155	150.0119	34.2845	0.0000	0.0000	0.0000	0.0000	179.3734	382.8601	562.1052 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2618.7168											
Space heating per m2	(98c) / (4) = 49.6910 (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)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
550.5433	423.6229	335.9155	150.0119	34.2845	0.0000	0.0000	0.0000	0.0000	0.0000	179.3734	382.8601	562.1052 (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)	596.4716	458.9630	363.9388	162.5265	37.1447	0.0000	0.0000	0.0000	0.0000	194.3374	414.7996	608.9981 (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	198.7300	175.9048	187.4055	166.1917	162.0286	147.0224	145.9099	151.1765	152.2363	168.5168	177.6423	196.7609 (64)
Efficiency of water heater (217)m	86.2209	85.9557	85.3528	83.8308	81.2379	79.8000	79.8000	79.8000	79.8000	84.2001	85.7354	79.8000 (216)
Fuel for water heating, kWh/month	230.4895	204.6460	219.5659	198.2465	199.4494	184.2385	182.8445	189.4442	190.7724	200.1385	207.1982	228.0571 (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)

Full SAP Calculation Printout



Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.1646	12.9679	11.6761	8.5544	6.6077	5.3985	6.0277	7.8351	10.1770	13.3528	15.0820	(232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-5.8561	-9.1028	-14.4108	-17.9019	-20.8656	-20.0670	-19.8299	-17.9287	-14.8871	-11.1137	-6.7329	(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	(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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-1.1588	-2.5441	-5.2626	-8.2182	-11.1824	-11.3486	-11.2099	-9.3401	-6.6556	-3.7318	-1.5763	(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											2837.1796	(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											2435.0907	(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)											130.4577	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-236.8027	(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											5251.9254	(238)

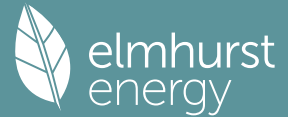
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2837.1796	0.2100	595.8077	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2435.0907	0.2100	511.3691	(264)
Space and water heating			1107.1768	(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 CO2, kg/year			1107.1068	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			21.0100	(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	2837.1796	1.1300	3206.0130	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2435.0907	1.1300	2751.6525	(278)
Space and water heating			5957.6655	(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			6010.5167	(286)
Target Primary Energy Rate (TPER)			114.0500	(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	77 C		DER	13.09		TER	15.99	
Environmental	90 B		% DER < TER				18.14	
CO ₂ Emissions (t/year)	0.82		DFEE	41.31		TFEE	42.54	
Compliance Check	See BREL		% DFEE < TFEE				2.90	
% DPER < TPER	-1.92		DPER	88.44		TPER	86.77	
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)

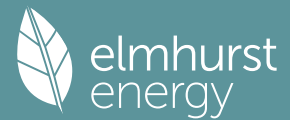
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	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)
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							

Full SAP Calculation Printout



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) = 40.4156 (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	22.4033	22.1805	21.9577	20.8436	20.6208	19.5068	19.5068	19.2840	19.9524	20.6208	21.0665	21.5121 (38)
Average = Sum(39)m / 12 =	62.8189	62.5961	62.3733	61.2593	61.0364	59.9224	59.9224	59.6996	60.3680	61.0364	61.4821	61.9277 (39)
	62.8189	62.5961	62.3733	61.2593	61.0364	59.9224	59.9224	59.6996	60.3680	61.0364	61.4821	61.2036
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9193	0.9161	0.9128	0.8965	0.8933	0.8770	0.8770	0.8737	0.8835	0.8933	0.8998	0.9063 (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)	62.8189	62.5961	62.3733	61.2593	61.0364	59.9224	59.9224	59.6996	60.3680	61.0364	61.4821	61.2036 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	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	180.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	0.0500 (48)											
Temperature factor from Table 2b	0.7800 (49)											
Enter (49) or (54) in (55)	0.0390 (55)											
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	253.7755	224.6096	238.8488	210.3018	204.1202	153.6157	150.2668	157.2638	160.1296	212.3626	225.4918	251.0218 (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	253.7755	224.6096	238.8488	210.3018	204.1202	153.6157	150.2668	157.2638	160.1296	212.3626	225.4918	251.0218 (64)
12Total per year (kWh/year)	2441.8081 (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	110.5915	98.3573	105.6284	95.2910	94.0811	62.1485	61.4041	63.7306	64.3144	96.8217	100.3416	109.6759 (65)

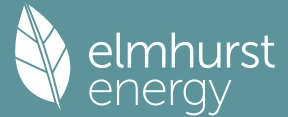
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	97.5126	107.9604	97.5126	100.7630	97.5126	100.7630	97.5126	97.5126	100.7630	97.5126	100.7630	97.5126 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	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)
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)	-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)	148.6445	146.3650	141.9736	132.3486	126.4531	86.3174	82.5324	85.6594	89.3256	130.1367	139.3634	147.4138 (72)
Total internal gains	495.5991	505.7739	485.8783	468.7391	446.0048	396.3484	380.7810	381.9014	393.8745	442.1998	468.2653	485.8365 (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	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	592.5500	672.9353	719.9562	767.7577	789.1314	740.6010	711.1761	678.8384	650.3556	628.3940	584.7577	568.5685 (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	0.9992	0.9963	0.9830	0.9019	0.7145	0.5177	0.3707	0.4045	0.6391	0.9238	0.9956	0.9995 (86)
MIT	20.5908	20.6978	20.8237	20.9562	20.9966	20.9999	21.0000	21.0000	20.9992	20.9513	20.7556	20.5766 (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	0.9987	0.9939	0.9728	0.8621	0.6535	0.4520	0.3022	0.3333	0.5642	0.8819	0.9924	0.9991 (89)
MIT 2	19.7893	19.8976	20.0209	20.1448	20.1719	20.1871	20.1871	20.1899	20.1814	20.1462	19.9675	19.7851 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.2208	20.3284	20.4532	20.5817	20.6159	20.6247	20.6248	20.6261	20.6217	20.5797	20.3918	20.2113 (92)
Temperature adjustment	0.3000											
adjusted MIT	20.5208	20.6284	20.7532	20.8817	20.9159	20.9247	20.9248	20.9261	20.9217	20.8797	20.6918	20.5113 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9990	0.9954	0.9805	0.8968	0.7084	0.5116	0.3644	0.3980	0.6320	0.9186	0.9946	0.9993 (94)
Useful gains	591.9428	669.8196	705.8817	688.5277	559.0349	378.9146	259.1505	270.2012	411.0220	577.2227	581.6252	568.1787 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1018.9756	984.5395	889.0162	733.9899	562.5078	378.9936	259.1519	270.2049	411.8124	627.4335	835.6513	1010.1212 (97)
Space heating kWh	317.7124	211.4917	136.2521	32.7327	2.5839	0.0000	0.0000	0.0000	0.0000	37.3568	182.8988	328.8052 (98a)
Space heating requirement - total per year (kWh/year)	1249.8337											
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	317.7124	211.4917	136.2521	32.7327	2.5839	0.0000	0.0000	0.0000	0.0000	37.3568	182.8988	328.8052 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1249.8337											
Space heating per m2	(98c) / (4) = 18.2911 (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 %)	83.9000 (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	317.7124	211.4917	136.2521	32.7327	2.5839	0.0000	0.0000	0.0000	0.0000	37.3568	182.8988	328.8052 (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)	317.7124	211.4917	136.2521	32.7327	2.5839	0.0000	0.0000	0.0000	0.0000	37.3568	182.8988	328.8052 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	253.7755	224.6096	238.8488	210.3018	204.1202	153.6157	150.2668	157.2638	160.1296	212.3626	225.4918	251.0218 (64)
Efficiency of water heater (217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	80.3000 (216)
Fuel for water heating, kWh/month	337.0193	298.2863	317.1963	279.2853	271.0760	204.0049	199.5575	208.8496	212.6556	282.0220	299.4579	333.3623 (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	1249.8337 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	80.3000											
Water heating fuel used	3242.7730 (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	4903.3756	(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	1249.8337	0.1583	197.7877	(261)
Space heating - main system 2	0.0000	0.2100	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3242.7730	0.2100	680.9823	(264)
Space and water heating			878.7701	(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			936.6967	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.7100	(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	1249.8337	1.5858	1981.9928	(275)
Space heating - main system 2	0.0000	1.1300	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3242.7730	1.1300	3664.3335	(278)
Space and water heating			5646.3263	(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			6271.2862	(286)
Dwelling Primary energy Rate (DPER)			91.7800	(287)

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

1. Overall dwelling characteristics

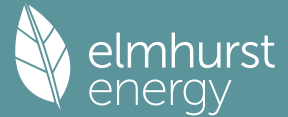
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	68.3300	3.4000	232.3220	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3300			(4)
Dwelling volume			232.3220	(5)

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 42.5608	Feb 42.3967	Mar 42.2357	Apr 41.4799	May 41.3385	Jun 40.6802	Jul 40.6802	Aug 40.5583	Sep 40.9338	Oct 41.3385	Nov 41.6246	Dec 41.9237	(38)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												85.6056	
HLP	Jan 1.2687	Feb 1.2663	Mar 1.2639	Apr 1.2528	May 1.2508	Jun 1.2411	Jul 1.2411	Aug 1.2393	Sep 1.2448	Oct 1.2508	Nov 1.2550	Dec 1.2593	(40)
HLP (average)												1.2528	
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	62.4281	(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	27.2801	(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	38.6636	(42c)	
Average daily hot water use (litres/day)													114.7523	(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Daily hot water use	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	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)	
Energy content (annual)										Total = Sum(45)m =		1906.0115		
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	29.2433	(46)	
Water storage loss:														
Store volume													180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8381	(55)
Total storage loss														
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	(56)	
If cylinder contains dedicated solar storage														
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	(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														
246.9516	218.4460	232.0249	203.6980	197.2963	177.5879	175.0381	182.0350	184.1018	205.5387	218.8880	244.1979	244.1979	(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														
218.9787	193.7066	206.1191	182.2471	177.3047	160.4810	159.0031	164.9834	166.4024	184.6729	195.2496	216.7430	216.7430	(64)	
Total per year (kWh/year)													2225.8916	(64)
Electric shower(s)													2226	(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														
105.1324	93.4264	100.1692	90.0079	88.6220	81.3263	81.2211	83.5476	83.4922	91.3626	95.0586	104.2167	104.2167	(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	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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), 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	98.2964	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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	184.8365	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.0245	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)
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)

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)	141.3069	139.0274	134.6360	125.0110	119.1155	112.9532	109.1682	112.2952	115.9614	122.7991	132.0258	140.0763 (72)
Total internal gains	492.0453	502.3041	482.3246	465.2115	442.4510	423.7941	408.2006	409.3210	421.3202	438.6461	464.7377	482.2828 (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	625.6559	732.6734	804.9131	877.2965	915.3224	898.2172	863.5263	818.5373	774.7832	695.2450	625.2787	596.2978 (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	0.9979	0.9914	0.9534	0.8222	0.6011	0.4319	0.4755	0.7393	0.9705	0.9981	0.9997 (86)
MIT	20.3003	20.4367	20.6133	20.8300	20.9640	20.9976	20.9999	20.9997	20.9880	20.8175	20.5162	20.2765 (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	0.9965	0.9853	0.9232	0.7443	0.4986	0.3228	0.3609	0.6303	0.9441	0.9964	0.9995 (89)
MIT 2	19.0748	19.2504	19.4743	19.7360	19.8601	19.8866	19.8872	19.8886	19.8803	19.7301	19.3596	19.0503 (90)
Living area fraction									f _{LA} = Living area / (4) =			0.5384 (91)
MIT	19.7346	19.8891	20.0876	20.3250	20.4544	20.4848	20.4863	20.4868	20.4767	20.3156	19.9823	19.7105 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7346	19.8891	20.0876	20.3250	20.4544	20.4848	20.4863	20.4868	20.4767	20.3156	19.9823	19.7105 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9991	0.9965	0.9867	0.9369	0.7863	0.5540	0.3816	0.4227	0.6899	0.9564	0.9966	0.9994 (94)
Useful gains	625.1124	730.1168	794.2461	821.9618	719.6739	497.6555	329.5320	345.9740	534.5303	664.9011	623.1497	595.9475 (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	1337.9867	1296.9065	1173.4520	978.0558	748.1971	499.0682	329.5831	346.0936	542.4011	830.3408	1104.6730	1334.6804 (97)
Space heating kWh	530.3785	380.8826	282.1292	112.3877	21.2212	0.0000	0.0000	0.0000	0.0000	123.0871	346.6968	549.6173 (98a)
Space heating requirement - total per year (kWh/year)												2346.4004
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	530.3785	380.8826	282.1292	112.3877	21.2212	0.0000	0.0000	0.0000	0.0000	123.0871	346.6968	549.6173 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2346.4004
Space heating per m ²										(98c) / (4) =		34.3392 (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	530.3785	380.8826	282.1292	112.3877	21.2212	0.0000	0.0000	0.0000	0.0000	123.0871	346.6968	549.6173 (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)	574.6246	412.6572	305.6654	121.7634	22.9916	0.0000	0.0000	0.0000	0.0000	133.3555	375.6195	595.4683 (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	218.9787	193.7066	206.1191	182.2471	177.3047	160.4810	159.0031	164.9834	166.4024	184.6729	195.2496	216.7430 (64)
Efficiency of water heater (217)m	85.9668	85.5474	84.7642	83.0092	80.6740	79.8000	79.8000	79.8000	79.8000	83.1713	85.3327	79.8000 (216)
Fuel for water heating, kWh/month	254.7248	226.4319	243.1676	219.5506	219.7792	201.1040	199.2520	206.7462	208.5243	222.0391	228.8098	251.8654 (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												2542.1456	(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												2681.9949	(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												5167.9397	(238)

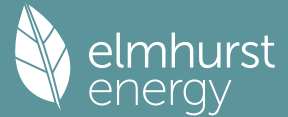
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2542.1456	0.2100	533.8506 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2681.9949	0.2100	563.2189 (264)
Space and water heating			1097.0695 (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			1092.8267 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9900 (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	2542.1456	1.1300	2872.6246 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2681.9949	1.1300	3030.6543 (278)
Space and water heating			5903.2788 (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			5928.8753 (286)
Target Primary Energy Rate (TPER)			86.7700 (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	84 B	DER	11.46	TER	12.33	
Environmental	91 B	% DER < TER				7.06
CO ₂ Emissions (t/year)	0.68	DFEE	22.90	TFEE	24.16	
Compliance Check	See BREL	% DFEE < TFEE				5.25
% DPER < TPER	-3.65	DPER	69.58	TPER	67.13	
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	62.7800 (1b)	2.4000 (2b)	150.6720 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.7800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	150.6720 (5)

2. Ventilation rate

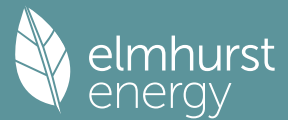
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	245.8708	217.6542	231.5412	204.0632	198.2011	148.4210	145.2375	151.9546	154.6742	206.1136	218.6455	243.2271 (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	245.8708	217.6542	231.5412	204.0632	198.2011	148.4210	145.2375	151.9546	154.6742	206.1136	218.6455	243.2271 (64)
12Total per year (kWh/year)												2365.6041 (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	107.9632	96.0446	103.1986	93.2166	92.1130	60.4213	59.7319	61.9653	62.5005	94.7439	98.0653	107.0842 (65)

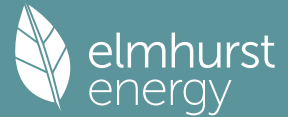
5. Internal gains (see Table 5 and 5a)

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	145.1118	142.9235	138.7078	129.4675	123.8078	83.9185	80.2847	83.2867	86.8063	127.3440	136.2018	143.9303 (72)
	469.6360	479.0366	460.3945	444.1641	422.8378	374.0915	359.4955	360.6306	371.8791	419.4070	443.9313	460.5169 (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	
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	264.2448
Total gains	504.2283	547.6670	581.2403	640.9515	687.5750	656.7747	623.7403
							210.2728
							146.4993
							83.0037
							43.1732
							28.4933 (83)
							489.0102 (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	0.9871	0.9658	0.9016	0.7100	0.5093	0.3593	0.2601	0.2958	0.4950	0.7700	0.9526	0.9896 (86)	
MIT	20.7855	20.8659	20.9495	20.9964	20.9999	21.0000	21.0000	21.0000	21.0000	20.9932	20.9099	20.7753 (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	0.9825	0.9555	0.8792	0.6778	0.4782	0.3279	0.2271	0.2600	0.4546	0.7314	0.9374	0.9860 (89)	
MIT 2	20.2264	20.3041	20.3793	20.4256	20.4300	20.4414	20.4414	20.4437	20.4369	20.4262	20.3557	20.2250 (90)	
Living area fraction	fLA = Living area / (4) =												0.4538 (91)
MIT	20.4802	20.5590	20.6381	20.6846	20.6886	20.6949	20.6949	20.6962	20.6924	20.6835	20.6072	20.4748 (92)	
Temperature adjustment													0.3000
adjusted MIT	20.7802	20.8590	20.9381	20.9846	20.9886	20.9949	20.9949	20.9962	20.9924	20.9835	20.9072	20.7748 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9855	0.9636	0.8994	0.7091	0.5087	0.3590	0.2598	0.2956	0.4944	0.7689	0.9504	0.9883 (94)	
Useful gains	496.9305	527.7264	522.7517	454.5306	349.7887	235.7916	162.0486	168.7404	256.2903	386.3205	462.9556	483.3056 (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	641.6094	618.7919	557.5292	457.0741	349.8501	235.7923	162.0486	168.7404	256.3203	391.0865	524.4156	634.7844 (97)	
Space heating kWh	107.6411	61.1960	25.8744	1.8313	0.0457	0.0000	0.0000	0.0000	0.0000	3.5459	44.2513	112.7002 (98a)	
Space heating requirement - total per year (kWh/year)													357.0859
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	107.6411	61.1960	25.8744	1.8313	0.0457	0.0000	0.0000	0.0000	0.0000	3.5459	44.2513	112.7002 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													357.0859
Space heating per m2	(98c) / (4) =												5.6879 (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 %)													83.9000 (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	107.6411	61.1960	25.8744	1.8313	0.0457	0.0000	0.0000	0.0000	0.0000	3.5459	44.2513	112.7002 (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)	107.6411	61.1960	25.8744	1.8313	0.0457	0.0000	0.0000	0.0000	0.0000	3.5459	44.2513	112.7002 (211)	
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	245.8708	217.6542	231.5412	204.0632	198.2011	148.4210	145.2375	151.9546	154.6742	206.1136	218.6455	243.2271 (64)	
Efficiency of water heater	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	80.3000 (216)	
Fuel for water heating, kWh/month	326.5216	289.0494	307.4916	271.0003	263.2153	197.1063	192.8785	201.7989	205.4106	273.7232	290.3659	323.0108 (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	13.3327	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													357.0859 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													3141.5725 (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	3807.7330 (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	357.0859	0.1599	57.0979 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	3141.5725	0.2100	659.7302 (264)
Space and water heating			716.8281 (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			760.5551 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.1100 (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	357.0859	1.5918	568.4149 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3141.5725	1.1300	3549.9769 (278)
Space and water heating			4118.3918 (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			4589.1588 (286)
Dwelling Primary energy Rate (DPER)			73.1000 (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	62.7800 (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

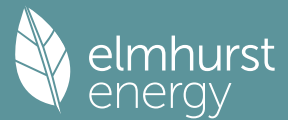
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1327 (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	Length	Psi-value	Total
K1 Element	6.3000	0.0500	0.3150
E2 Other lintels (including other steel lintels)	18.0000	0.0500	0.9000
E4 Jamb	31.4400	0.0700	2.2008
E7 Party floor between dwellings (in blocks of flats)	2.4000	0.0900	0.2160
E16 Corner (normal)	4.8000	0.0600	0.2880
E18 Party wall between dwellings	38.8800	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)			3.9198 (36)
Point Thermal bridges			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)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	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)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												52.4400
HLP	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)
HLP (average)												0.8353
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 (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 (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 (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 (44)	
Energy content	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)										Total = Sum(45)m =		1829.8075
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 (46)	
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)
Total storage loss												
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)	
If cylinder contains dedicated solar storage												
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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 (61)	
Total heat required for water heating calculated for each month												
239.0469	211.4906	224.7172	197.4594	191.3772	172.3932	170.0088	176.7259	178.6464	199.2897	212.0417	236.4032 (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	212.1920	187.7400	199.8469	176.8658	172.1847	155.9701	154.6147	160.3558	161.6544	179.2579	189.3482	210.0457 (64)
												Total per year (kWh/year) = Sum(64)m = 2160.0761 (64)
12Total per year (kWh/year)												2160 (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												
102.5040	91.1138	97.7394	87.9336	86.6539	79.5991	79.5489	81.7823	81.6783	89.2848	92.7822	101.6250 (65)	

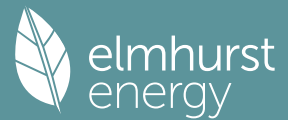
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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)												
137.7742	135.5859	131.3702	122.1300	116.4702	110.5543	106.9205	109.9224	113.4420	120.0064	128.8642	136.5928	136.5928 (72)
Total internal gains	465.2827	474.6815	456.0412	439.8102	418.4844	400.7110	386.1154	387.2506	398.4985	415.0536	439.5774	456.1635 (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	512.9551	569.2628	622.5818	711.0079	783.3254	790.2837	750.2778	677.0327	600.3929	529.4431	499.0755	495.4309 (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	0.9967	0.9908	0.9669	0.8412	0.6176	0.4180	0.3028	0.3499	0.5940	0.9113	0.9892	0.9975 (86)
MIT	20.4925	20.6085	20.7751	20.9516	20.9965	20.9999	21.0000	21.0000	20.9982	20.9183	20.6847	20.4764 (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	0.9953	0.9870	0.9542	0.8021	0.5676	0.3681	0.2501	0.2918	0.5290	0.8754	0.9840	0.9964 (89)
MIT 2	19.6276	19.7758	19.9816	20.1828	20.2227	20.2339	20.2339	20.2356	20.2296	20.1568	19.8817	19.6145 (90)
Living area fraction										FLA = Living area / (4) =		0.4538 (91)
MIT	20.0201	20.1537	20.3417	20.5317	20.5739	20.5815	20.5816	20.5825	20.5784	20.5024	20.2461	20.0056 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0201	20.1537	20.3417	20.5317	20.5739	20.5815	20.5816	20.5825	20.5784	20.5024	20.2461	20.0056 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9949	0.9867	0.9565	0.8183	0.5902	0.3907	0.2740	0.3182	0.5586	0.8894	0.9842	0.9961 (94)
Useful gains	510.3382	561.6885	595.5306	581.8163	462.3375	308.7976	205.5741	215.4288	335.3601	470.8805	491.1715	493.4740 (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	841.5652	814.0608	736.4531	609.9731	464.0821	308.8353	205.5753	215.4333	336.1509	517.8704	691.3150	835.9527 (97)
Space heating kWh	246.4329	169.5942	104.8464	20.2729	1.2980	0.0000	0.0000	0.0000	0.0000	34.9605	144.1033	254.8041 (98a)
Space heating requirement - total per year (kWh/year)												976.3121
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	246.4329	169.5942	104.8464	20.2729	1.2980	0.0000	0.0000	0.0000	0.0000	34.9605	144.1033	254.8041 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												976.3121
Space heating per m2										(98c) / (4) =		15.5513 (99)

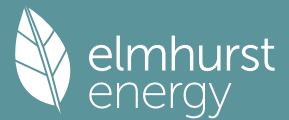
9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)

Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	246.4329	169.5942	104.8464	20.2729	1.2980	0.0000	0.0000	0.0000	0.0000	34.9605	144.1033	254.8041 (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)	266.9912	183.7423	113.5930	21.9641	1.4062	0.0000	0.0000	0.0000	0.0000	37.8770	156.1249	276.0608 (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	212.1920	187.7400	199.8469	176.8658	172.1847	155.9701	154.6147	160.3558	161.6544	179.2579	189.3482	210.0457 (64)
Efficiency of water heater (217)m	84.3961	83.8325	82.6836	80.6405	79.8606	79.8000	79.8000	79.8000	79.8000	81.1421	83.4553	79.8000 (216)
Fuel for water heating, kWh/month	251.4238	223.9464	241.7007	219.3263	215.6066	195.4512	193.7527	200.9471	202.5744	220.9184	226.8858	248.5922 (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	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)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-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)
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	-1.4026	-3.0776	-6.3642	-9.9371	-13.5222	-13.7276	-13.5639	-11.3043	-8.0561	-4.5178	-1.9086	-1.0998 (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												1057.7596 (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	2641.1258 (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	3654.9230 (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	1057.7596	0.2100	222.1295 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2641.1258	0.2100	554.6364 (264)
Space and water heating			776.7659 (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			773.9333 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1057.7596	1.1300	1195.2683 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2641.1258	1.1300	2984.4722 (278)
Space and water heating			4179.7405 (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			4214.1704 (286)
Target Primary Energy Rate (TPER)			67.1300 (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	86 B	DER	10.80	TER	11.01
Environmental	92 A	% DER < TER			1.91
CO ₂ Emissions (t/year)	0.66	DFEE	16.01	TFEE	16.91
Compliance Check	See BREL	% DFEE < TFEE			5.32
% DPER < TPER	-4.37	DPER	62.74	TPER	60.11
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)

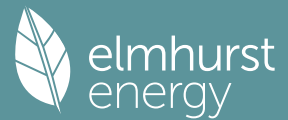
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	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	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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	245.1413	217.0124	230.8668	203.4875	197.6549	147.9417	144.7734	151.4647	154.1708	205.5369	218.0138	242.5079 (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	245.1413	217.0124	230.8668	203.4875	197.6549	147.9417	144.7734	151.4647	154.1708	205.5369	218.0138	242.5079 (64)
12Total per year (kWh/year)												2358.5720 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	107.7206	95.8312	102.9744	93.0252	91.9314	60.2619	59.5775	61.8024	62.3331	94.5522	97.8552	106.8450 (65)

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

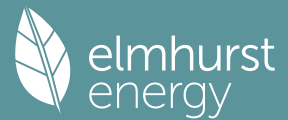
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793	102.2793 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
91.6373	101.4556	91.6373	94.6919	91.6373	94.6919	91.6373	91.6373	94.6919	91.6373	94.6919	91.6373	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	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	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	-81.8234 (71)
Water heating gains (Table 5)												
144.7858	142.6059	138.4064	129.2017	123.5637	83.6971	80.0773	83.0677	86.5738	127.0862	135.9100	143.6089	(72)
Total internal gains	468.7901	478.2827	459.5924	443.4952	422.2462	373.6329	359.0746	360.2108	371.4439	418.8489	443.2836	459.7292 (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							
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	493.3384	526.7655	544.6060	581.7152	608.2213	572.2731	544.7321	507.8973	474.4066	477.3753	473.8777	479.9795 (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	0.9402	0.8826	0.7840	0.6020	0.4405	0.3141	0.2269	0.2531	0.4127	0.6273	0.8397	0.9473 (86)
MIT	20.9463	20.9778	20.9952	20.9999	21.0000	21.0000	21.0000	21.0000	21.0000	20.9998	20.9904	20.9425 (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	0.9271	0.8638	0.7609	0.5798	0.4194	0.2928	0.2045	0.2293	0.3865	0.6006	0.8164	0.9353 (89)
MIT 2	20.4956	20.5239	20.5394	20.5532	20.5554	20.5660	20.5660	20.5681	20.5617	20.5553	20.5445	20.5005 (90)
Living area fraction									fLA = Living area /	(4) =		0.4707 (91)
MIT	20.7077	20.7376	20.7540	20.7634	20.7647	20.7703	20.7703	20.7714	20.7680	20.7645	20.7544	20.7086 (92)
Temperature adjustment												0.3000
adjusted MIT	21.0077	21.0376	21.0540	21.0634	21.0647	21.0703	21.0703	21.0714	21.0680	21.0645	21.0544	21.0086 (93)

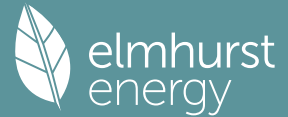
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9404	0.8840	0.7866	0.6052	0.4435	0.3176	0.2305	0.2570	0.4168	0.6312	0.8424	0.9475 (94)
Useful gains	463.9283	465.6775	428.4031	352.0348	269.7594	181.7461	125.5674	130.5472	197.7253	301.3115	399.2025	454.7616 (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	500.4501	481.0587	431.7653	352.1266	269.7604	181.7461	125.5674	130.5472	197.7256	301.4434	405.9751	493.8309 (97)
Space heating kWh	27.1722	10.3362	2.5015	0.0661	0.0007	0.0000	0.0000	0.0000	0.0000	0.0981	4.8763	29.0676 (98a)
Space heating requirement - total per year (kWh/year)												74.1188
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	27.1722	10.3362	2.5015	0.0661	0.0007	0.0000	0.0000	0.0000	0.0000	0.0981	4.8763	29.0676 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												74.1188
Space heating per m2										(98c) / (4) =		1.1899 (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 %)												83.9000 (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	27.1722	10.3362	2.5015	0.0661	0.0007	0.0000	0.0000	0.0000	0.0000	0.0981	4.8763	29.0676 (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)	27.1722	10.3362	2.5015	0.0661	0.0007	0.0000	0.0000	0.0000	0.0000	0.0981	4.8763	29.0676 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	245.1413	217.0124	230.8668	203.4875	197.6549	147.9417	144.7734	151.4647	154.1708	205.5369	218.0138	242.5079 (64)
Efficiency of water heater												80.3000 (216)
(217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000 (217)
Fuel for water heating, kWh/month	325.5529	288.1970	306.5961	270.2358	262.4899	196.4697	192.2622	201.1483	204.7421	272.9574	289.5269	322.0556 (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												74.1188 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												3132.2338 (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	3515.2282 (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	74.1188	0.1614	11.9628 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	3132.2338	0.2100	657.7691 (264)
Space and water heating			669.7319 (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			713.4371 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.4500 (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	74.1188	1.5973	118.3894 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	3132.2338	1.1300	3539.4241 (278)
Space and water heating			3657.8135 (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			4128.3012 (286)
Dwelling Primary energy Rate (DPER)			66.2800 (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)

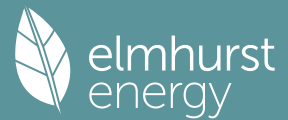
3. Heat losses and heat loss parameter

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												1822.7754
Water storage loss:	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)
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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	238.3174	210.8488	224.0429	196.8837	190.8309	171.9139	169.5447	176.2359	178.1430	198.7130	211.4100	235.6839 (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	211.5657	187.1894	199.2681	176.3692	171.7122	155.5538	154.2097	159.9288	161.2162	178.7582	188.8036	209.4276 (64)
12Total per year (kWh/year)												2154.0027 (64a)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	102.2615	90.9003	97.5152	87.7422	86.4722	79.4397	79.3946	81.6194	81.5109	89.0930	92.5722	101.3859 (65)

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	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	500.4224	543.1289	574.5534	631.8526	676.3447	676.2302	643.7089	592.5162	542.1857	497.3072	483.3191	485.4383 (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	0.9936	0.9835	0.9494	0.8041	0.5908	0.4021	0.2904	0.3291	0.5430	0.8571	0.9778	0.9950 (86)
MIT	20.6684	20.7595	20.8755	20.9803	20.9990	21.0000	21.0000	21.0000	20.9997	20.9702	20.8204	20.6546 (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	0.9911	0.9775	0.9333	0.7678	0.5499	0.3617	0.2480	0.2832	0.4924	0.8175	0.9687	0.9930 (89)
MIT 2	19.9588	20.0737	20.2136	20.3312	20.3482	20.3566	20.3567	20.3581	20.3535	20.3254	20.1577	19.9480 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.2928	20.3965	20.5252	20.6367	20.6545	20.6595	20.6595	20.6602	20.6577	20.6289	20.4696	20.2806 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.2928	20.3965	20.5252	20.6367	20.6545	20.6595	20.6595	20.6602	20.6577	20.6289	20.4696	20.2806 (93)

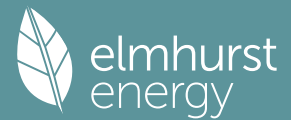
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9909	0.9781	0.9383	0.7843	0.5692	0.3807	0.2680	0.3048	0.5162	0.8352	0.9707	0.9928 (94)
Useful gains	495.8909	531.2591	539.0912	495.5411	384.9421	257.4569	172.4845	180.5790	279.8926	415.3596	469.1379	481.9546 (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	704.7609	680.7552	614.2275	506.5612	385.4193	257.4630	172.4847	180.5795	280.0257	431.6625	578.6613	700.0317 (97)
Space heating kWh	155.3993	100.4614	55.9014	7.9344	0.3550	0.0000	0.0000	0.0000	0.0000	12.1294	78.8568	162.2494 (98a)
Space heating requirement - total per year (kWh/year)	573.2872											
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	155.3993	100.4614	55.9014	7.9344	0.3550	0.0000	0.0000	0.0000	0.0000	12.1294	78.8568	162.2494 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	573.2872											
Space heating per m2	(98c) / (4) = 9.2035 (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	155.3993	100.4614	55.9014	7.9344	0.3550	0.0000	0.0000	0.0000	0.0000	12.1294	78.8568	162.2494 (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)	168.3633	108.8423	60.5649	8.5963	0.3846	0.0000	0.0000	0.0000	0.0000	13.1412	85.4354	175.7848 (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	211.5657	187.1894	199.2681	176.3692	171.7122	155.5538	154.2097	159.9288	161.2162	178.7582	188.8036	209.4276 (64)
Efficiency of water heater (217)m	83.3786	82.7283	81.6121	80.1497	79.8167	79.8000	79.8000	79.8000	79.8000	80.3172	82.2561	79.8000 (216)
Fuel for water heating, kWh/month	253.7412	226.2701	244.1650	220.0497	215.1332	194.9296	193.2453	200.4120	202.0254	222.5652	229.5314	250.8294 (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												
Space heating fuel - main system 2												
Space heating fuel - secondary												
Efficiency of water heater												
Water heating fuel used												
Space cooling fuel												
												621.1128 (211)
												0.0000 (213)
												0.0000 (215)
												79.8000
												2652.8973 (219)
												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	3237.3700 (238)

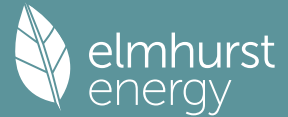
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	621.1128	0.2100	130.4337 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2652.8973	0.2100	557.1084 (264)
Space and water heating			687.5421 (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			685.7348 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0100 (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	621.1128	1.1300	701.8575 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2652.8973	1.1300	2997.7739 (278)
Space and water heating			3699.6314 (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			3744.3454 (286)
Target Primary Energy Rate (TPER)			60.1100 (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	85 B		DER	13.16		TER	12.60
Environmental	91 B		% DER < TER				-4.44
CO ₂ Emissions (t/year)	0.58		DFEE	13.47		TFEE	13.84
Compliance Check	See BREL		% DFEE < TFEE				2.68
% DPER < TPER	-8.33		DPER	74.87		TPER	69.11
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	0.5041
												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)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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											
	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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss												
	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage												
	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
	216.3317	191.6628	204.2335	180.7503	176.0821	129.0093	126.4436	132.1149	134.2880	182.7618	193.0621	214.0994 (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	216.3317	191.6628	204.2335	180.7503	176.0821	129.0093	126.4436	132.1149	134.2880	182.7618	193.0621	214.0994 (64)
12Total per year (kWh/year)												2080.8394 (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												
	98.1414	87.4024	94.1188	85.4651	84.7584	53.9669	53.4829	55.3686	55.7221	86.9794	89.5588	97.3992 (65)

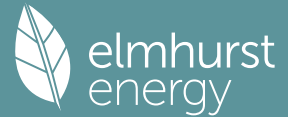
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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)												
	131.9105	130.0632	126.5037	118.7015	113.9226	74.9541	71.8856	74.4201	77.3918	116.9078	124.3872	130.9129 (72)
Total internal gains	375.6162	382.2577	368.1353	355.2289	338.9926	293.5553	282.4681	283.6381	292.2649	336.8851	355.8218	368.8163 (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											
Southwest	8.1000						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	441.7074	494.8354	522.1690	546.8841	552.7663	505.7831	487.0784	471.1501	459.0508	461.3074	434.9838	425.3766 (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	0.8476	0.7381	0.6292	0.4912	0.3712	0.2728	0.1948	0.2095	0.3271	0.4975	0.7100	0.8657 (86)
MIT	20.9852	20.9973	20.9997	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9987	20.9820 (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	0.8266	0.7162	0.6079	0.4715	0.3520	0.2527	0.1739	0.1882	0.3046	0.4744	0.6857	0.8457 (89)
MIT 2	20.4911	20.5020	20.5058	20.5165	20.5186	20.5292	20.5292	20.5313	20.5250	20.5186	20.5136	20.4970 (90)
Living area fraction									fLA = Living area / (4) =			0.6214 (91)
MIT	20.7981	20.8097	20.8127	20.8169	20.8177	20.8217	20.8217	20.8225	20.8201	20.8177	20.8150	20.7984 (92)
Temperature adjustment												0.3000
adjusted MIT	21.0981	21.1097	21.1127	21.1169	21.1177	21.1217	21.1217	21.1225	21.1201	21.1177	21.1150	21.0984 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8516	0.7429	0.6341	0.4959	0.3759	0.2780	0.2002	0.2151	0.3328	0.5031	0.7157	0.8696 (94)
Useful gains	376.1728	367.6178	331.1064	270.8040	207.8083	140.6097	97.4893	101.3412	152.7747	232.0750	311.3350	369.9023 (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	384.2469	369.1494	331.3011	270.8095	207.8084	140.6097	97.4893	101.3412	152.7747	232.0805	312.0839	379.7066 (97)
Space heating kWh	6.0071	1.0292	0.1449	0.0039	0.0001	0.0000	0.0000	0.0000	0.0000	0.0040	0.5392	7.2944 (98a)
Space heating requirement - total per year (kWh/year)												15.0229
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	6.0071	1.0292	0.1449	0.0039	0.0001	0.0000	0.0000	0.0000	0.0000	0.0040	0.5392	7.2944 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												15.0229
Space heating per m2										(98c) / (4) =		0.3421 (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 %)												83.9000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	6.0071	1.0292	0.1449	0.0039	0.0001	0.0000	0.0000	0.0000	0.0000	0.0040	0.5392	7.2944 (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)	6.0071	1.0292	0.1449	0.0039	0.0001	0.0000	0.0000	0.0000	0.0000	0.0040	0.5392	7.2944 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	216.3317	191.6628	204.2335	180.7503	176.0821	129.0093	126.4436	132.1149	134.2880	182.7618	193.0621	214.0994 (64)
Efficiency of water heater												80.3000 (216)
(217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000 (217)
Fuel for water heating, kWh/month	287.2931	254.5322	271.2265	240.0402	233.8408	171.3271	167.9197	175.4513	178.3373	242.7116	256.3905	284.3285 (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												15.0229 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2763.3989 (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	2999.0429 (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	15.0229	0.1623	2.4375 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	2763.3989	0.2100	580.3138 (264)
Space and water heating			582.7513 (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			613.9565 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.9800 (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	15.0229	1.6004	24.0426 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	2763.3989	1.1300	3122.6407 (278)
Space and water heating			3146.6834 (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			3482.6938 (286)
Dwelling Primary energy Rate (DPER)			79.3000 (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	43.9200	2.4000	105.4080
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	43.9200		
Dwelling volume			

2. Ventilation rate

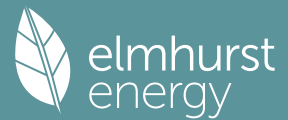
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1897 (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)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	20.6761	20.5486	20.4236	19.8365	19.7267	19.2154	19.2154	19.1207	19.4123	19.7267	19.9489	20.1812
Heat transfer coeff	33.8600	33.7325	33.6075	33.0205	32.9106	32.3993	32.3993	32.3046	32.5963	32.9106	33.1328	33.3651
Average = Sum(39)m / 12 =												33.0200

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7709	0.7680	0.7652	0.7518	0.7493	0.7377	0.7377	0.7355	0.7422	0.7493	0.7544	0.7597
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)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101.1931	99.0332	96.4024	92.4009	89.1518	85.6587	84.3154	86.9348	89.6975	93.3648	97.4280	100.9305	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
Energy content (annual)												
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	23.7049 (46)

Water storage loss:
 Store volume 180.0000 (47)
 a) If manufacturer declared loss factor is known (kWh/day): 1.5520 (48)
 Temperature factor from Table 2b 0.5400 (49)
 Enter (49) or (54) in (55) 0.8381 (55)

a) If manufacturer declared loss factor is known (kWh/day):											1.5520 (48)	
Temperature factor from Table 2b											0.5400 (49)	
Enter (49) or (54) in (55)											0.8381 (55)	
Total storage loss												
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage												
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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	209.5078	185.4992	197.4096	174.1465	169.2582	152.9815	151.2148	156.8861	158.2602	175.9379	186.4583	207.2754	207.2754 (62)
WWHRS	-22.6768	-20.0556	-21.0010	-17.3897	-16.2066	-13.8681	-12.9991	-13.8232	-14.3484	-16.9152	-19.1629	-22.2569	-22.2569 (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	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	186.8310	165.4436	176.4086	156.7568	153.0516	139.1134	138.2157	143.0629	143.9117	159.0226	167.2954	185.0186	185.0186 (64)
Total per year (kWh/year)													1914.1319 (64)

12Total per year (kWh/year)													1914 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	92.6823	82.4716	88.6596	80.1820	79.2993	73.1447	73.2999	75.1856	74.8998	81.5203	84.2757	91.9400	91.9400 (65)

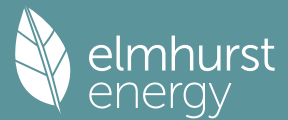
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	75.6990	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	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)
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	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)	-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)	124.5730	122.7256	119.1662	111.3639	106.5851	101.5899	98.5213	101.0559	104.0276	109.5703	117.0496	123.5753 (72)
Total internal gains	372.2764	379.0248	364.7955	351.9224	335.6528	321.2221	310.1016	311.2716	319.9317	333.5453	352.5153	365.4765 (73)

6. Solar gains

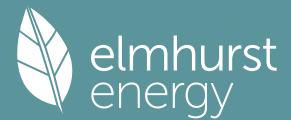
[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

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	463.3583	534.1709	577.0732	614.9447	630.2597	613.6986	592.0802	569.6866	549.7835	505.0148	461.6104	443.4236 (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	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	0.9725	0.9170	0.8164	0.6470	0.4855	0.3379	0.2408	0.2608	0.4091	0.6737	0.9100	0.9792 (86)	
MIT	20.7893	20.9023	20.9702	20.9969	20.9998	21.0000	21.0000	21.0000	21.0000	20.9963	20.9255	20.7679 (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	0.9630	0.8959	0.7839	0.6104	0.4489	0.3013	0.2029	0.2217	0.3678	0.6299	0.8842	0.9718 (89)	
MIT 2	20.0554	20.1862	20.2580	20.2930	20.2974	20.3077	20.3077	20.3096	20.3037	20.2950	20.2247	20.0388 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	20.5114	20.6312	20.7006	20.7304	20.7338	20.7378	20.7378	20.7386	20.7363	20.7307	20.6602	20.4918 (92)	
Temperature adjustment	0.0000												
adjusted MIT	20.5114	20.6312	20.7006	20.7304	20.7338	20.7378	20.7378	20.7386	20.7363	20.7307	20.6602	20.4918 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9664	0.9067	0.8031	0.6330	0.4716	0.3240	0.2264	0.2460	0.3934	0.6571	0.8982	0.9741 (94)	
Useful gains	447.7800	484.3103	463.4684	389.2875	297.2413	198.8612	134.0636	140.1558	216.3120	331.8210	414.6105	431.9541 (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	548.9190	530.6518	477.2461	390.6452	297.3097	198.8622	134.0636	140.1559	216.3202	333.4089	449.2865	543.5787 (97)	
Space heating kWh	75.2474	31.1415	10.2506	0.9776	0.0509	0.0000	0.0000	0.0000	0.0000	1.1814	24.9667	83.0487 (98a)	
Space heating requirement - total per year (kWh/year)	226.8649												
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	75.2474	31.1415	10.2506	0.9776	0.0509	0.0000	0.0000	0.0000	0.0000	1.1814	24.9667	83.0487 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	226.8649												
Space heating per m2	(98c) / (4) = 5.1654 (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	75.2474	31.1415	10.2506	0.9776	0.0509	0.0000	0.0000	0.0000	0.0000	1.1814	24.9667	83.0487 (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)	81.5249	33.7395	11.1058	1.0591	0.0551	0.0000	0.0000	0.0000	0.0000	1.2800	27.0495	89.9769 (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	186.8310	165.4436	176.4086	156.7568	153.0516	139.1134	138.2157	143.0629	143.9117	159.0226	167.2954	185.0186 (64)	
Water heating requirement	82.1918	81.1021	80.2466	79.8502	79.8027	79.8000	79.8000	79.8000	79.8000	79.8597	80.8643	79.8000 (216)	
Efficiency of water heater	82.3869 (217)												
Fuel for water heating, kWh/month	227.3110	203.9942	219.8330	196.3137	191.7876	174.3276	173.2027	179.2768	180.3405	199.1275	206.8841	224.5728 (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	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)	
Lighting													
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													
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													
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													
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													
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													
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													
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													
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													
Annual totals kWh/year													
Space heating fuel - main system 1	245.7908 (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	2376.9715 (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	2624.5878 (238)

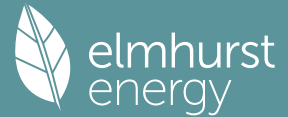
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	245.7908	0.2100	51.6161 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2376.9715	0.2100	499.1640 (264)
Space and water heating			550.7801 (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			553.3477 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6000 (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	245.7908	1.1300	277.7436 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2376.9715	1.1300	2685.9778 (278)
Space and water heating			2963.7214 (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			3035.1775 (286)
Target Primary Energy Rate (TPER)			69.1100 (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	85 B		DER	13.19		TER	13.20
Environmental	91 B		% DER < TER				0.08
CO ₂ Emissions (t/year)	0.58		DFEE	16.51		TFEE	17.68
Compliance Check	See BREL		% DFEE < TFEE				6.61
% DPER < TPER	-4.05		DPER	75.26		TPER	72.33
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	44.0000 (1b)	2.4000 (2b)	105.6000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		105.6000 (4)
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	

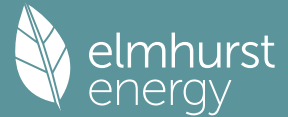
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.5162 (42)
Hot water usage for mixer showers												49.4516 (42a)
Hot water usage for baths												21.3982 (42b)
Hot water usage for other uses												30.1578 (42c)
Average daily hot water use (litres/day)												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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
	216.4542	191.7705	204.3467	180.8469	176.1738	129.0898	126.5215	132.1971	134.3725	182.8586	193.1681	214.2201 (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	216.4542	191.7705	204.3467	180.8469	176.1738	129.0898	126.5215	132.1971	134.3725	182.8586	193.1681	214.2201 (64)
Total per year (kWh/year) = Sum(64)m =												2082.0197 (64)
12Total per year (kWh/year)												2082 (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												
	98.1821	87.4383	94.1564	85.4972	84.7889	53.9937	53.5088	55.3959	55.7502	87.0116	89.5940	97.4393 (65)

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)	131.9652	130.1165	126.5543	118.7461	113.9636	74.9912	71.9204	74.4569	77.4308	116.9511	124.4361	130.9668 (72)
Total internal gains	376.0224	382.6766	368.5341	355.6140	339.3559	293.9049	282.8026	283.9723	292.6105	337.2427	356.2033	369.2126 (73)

[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
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	396.2894	423.9307	442.8610	477.6801	503.4367	468.8324	446.4437	414.4289	383.1790	387.6586	381.7045	385.7637 (84)	

Page 2 of 7

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												
	0.8982	0.8262	0.7168	0.5430	0.3941	0.2843	0.2053	0.2301	0.3787	0.5723	0.7796	0.9076 (86)
MIT	20.9729	20.9908	20.9986	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	20.9965	20.9704 (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												
	0.8801	0.8045	0.6937	0.5220	0.3744	0.2641	0.1841	0.2074	0.3535	0.5468	0.7548	0.8905 (89)
MIT 2	20.4974	20.5134	20.5211	20.5325	20.5347	20.5453	20.5453	20.5474	20.5410	20.5347	20.5282	20.5038 (90)
Living area fraction									fLA = Living area / (4) =			0.6180 (91)
MIT	20.7912	20.8084	20.8161	20.8214	20.8222	20.8263	20.8263	20.8271	20.8247	20.8222	20.8176	20.7922 (92)
Temperature adjustment												0.3000
adjusted MIT	21.0912	21.1084	21.1161	21.1214	21.1222	21.1263	21.1263	21.1271	21.1247	21.1222	21.1176	21.0922 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9015	0.8309	0.7224	0.5484	0.3993	0.2900	0.2112	0.2364	0.3856	0.5791	0.7857	0.9108 (94)
Useful gains	357.2451	352.2561	319.9275	261.9833	201.0366	135.9426	94.2825	97.9866	147.7467	224.4792	299.9204	351.3435 (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	371.8696	357.3212	320.7383	261.9988	201.0367	135.9426	94.2825	97.9866	147.7468	224.5061	301.9240	367.2616 (97)
Space heating kWh	10.8807	3.4037	0.6032	0.0112	0.0001	0.0000	0.0000	0.0000	0.0000	0.0200	1.4426	11.8431 (98a)
Space heating requirement - total per year (kWh/year)												28.2046
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	10.8807	3.4037	0.6032	0.0112	0.0001	0.0000	0.0000	0.0000	0.0000	0.0200	1.4426	11.8431 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												28.2046
Space heating per m2										(98c) / (4) =		0.6410 (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 %)													83.9000 (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	10.8807	3.4037	0.6032	0.0112	0.0001	0.0000	0.0000	0.0000	0.0000	0.0200	1.4426	11.8431	(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)	10.8807	3.4037	0.6032	0.0112	0.0001	0.0000	0.0000	0.0000	0.0000	0.0200	1.4426	11.8431	(211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000	(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	216.4542	191.7705	204.3467	180.8469	176.1738	129.0898	126.5215	132.1971	134.3725	182.8586	193.1681	214.2201	(64)
Efficiency of water heater													80.3000 (216)
(217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	(217)
Fuel for water heating, kWh/month	287.4557	254.6753	271.3768	240.1685	233.9626	171.4340	168.0232	175.5605	178.4495	242.8401	256.5314	284.4889	(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													28.2046 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													2764.9664 (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	3014.1795 (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	28.2046	0.1618	4.5630 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	2764.9664	0.2100	580.6429 (264)
Space and water heating			585.2060 (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			616.4659 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.0100 (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	28.2046	1.5987	45.0900 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	2764.9664	1.1300	3124.4120 (278)
Space and water heating			3169.5020 (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			3506.1022 (286)
Dwelling Primary energy Rate (DPER)			79.6800 (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)

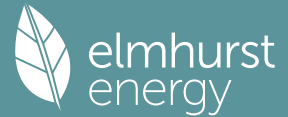
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1894 (8)
Pressure test	Yes		
Pressure Test Method			
Measured/design AP50		Blower Door	
Infiltration rate		5.0000	(17)
Number of sides sheltered		0.4394	(18)
		3	(19)
Shelter factor	(20) = 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)

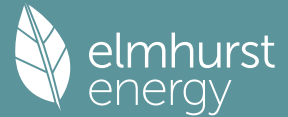
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	20.7086	20.5810	20.4560	19.8688	19.7589	19.2475	19.2475	19.1528	19.4445	19.7589	19.9812	20.2136	(38)
Average = Sum(39)m / 12 =	33.0184	32.8908	32.7658	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	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													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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	209.6302	185.6069	197.5228	174.2431	169.3499	153.0620	151.2927	156.9684	158.3447	176.0347	186.5643	207.3962	(62)
WWHRS	-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)
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	186.9361	165.5361	176.5057	156.8401	153.1309	139.1833	138.2837	143.1346	143.9853	159.1065	167.3868	185.1223	(64)
12Total per year (kWh/year)													1915.1513 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	92.7230	82.5074	88.6973	80.2142	79.3298	73.1714	73.3258	75.2129	74.9279	81.5525	84.3110	91.9802	(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	124.6277	122.7789	119.2168	111.4086	106.6261	101.6270	98.5562	101.0926	104.0666	109.6135	117.0986	123.6293	(72)
	372.6943	379.4566	365.2060	352.3195	336.0278	321.5838	310.4478	311.6176	320.2894	333.9146	352.9089	365.8845	(73)

6. Solar gains													
[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m2	Table 6a	W/m2	Specific data	factor	W						
					or Table 6b	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	400.6248	436.3100	467.6377	520.5419	562.1517	562.6558	535.9657	491.4030	445.1041	403.3940	388.0527	388.6940 (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												
	0.9894	0.9730	0.9188	0.7387	0.5302	0.3589	0.2591	0.2945	0.4921	0.8050	0.9636	0.9915 (86)
MIT	20.7146	20.8066	20.9163	20.9911	20.9997	21.0000	21.0000	21.0000	20.9999	20.9838	20.8618	20.7031 (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												
	0.9852	0.9634	0.8957	0.7001	0.4913	0.3211	0.2194	0.2515	0.4438	0.7602	0.9494	0.9880 (89)
MIT 2	19.9812	20.0954	20.2227	20.3065	20.3152	20.3257	20.3257	20.3275	20.3217	20.3038	20.1732	19.9756 (90)
Living area fraction												
										FLA = Living area / (4) =		0.6180 (91)
MIT	20.4344	20.5349	20.6513	20.7296	20.7382	20.7424	20.7424	20.7431	20.7408	20.7240	20.5987	20.4252 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4344	20.5349	20.6513	20.7296	20.7382	20.7424	20.7424	20.7431	20.7408	20.7240	20.5987	20.4252 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9861	0.9669	0.9078	0.7237	0.5154	0.3445	0.2439	0.2781	0.4737	0.7875	0.9559	0.9887 (94)
Useful gains	395.0658	421.8841	424.5372	376.7301	289.7127	193.8351	130.7220	136.6449	210.8339	317.6596	370.9296	384.3030 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	11.6000	7.1000	4.2000 (96)
Heat loss rate W												
	532.7319	514.2455	463.6789	380.6593	289.8435	193.8366	130.7220	136.6450	210.8733	324.6646	435.8879	527.6978 (97)
Space heating kWh												
	102.4236	62.0668	29.1214	2.8290	0.0973	0.0000	0.0000	0.0000	0.0000	5.2117	46.7700	106.6857 (98a)
Space heating requirement - total per year (kWh/year)												355.2056
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												
	102.4236	62.0668	29.1214	2.8290	0.0973	0.0000	0.0000	0.0000	0.0000	5.2117	46.7700	106.6857 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												355.2056
Space heating per m2										(98c) / (4) =		8.0729 (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												
	102.4236	62.0668	29.1214	2.8290	0.0973	0.0000	0.0000	0.0000	0.0000	5.2117	46.7700	106.6857 (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)												
	110.9681	67.2447	31.5508	3.0650	0.1054	0.0000	0.0000	0.0000	0.0000	5.6465	50.6717	115.5858 (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												
	186.9361	165.5361	176.5057	156.8401	153.1309	139.1833	138.2837	143.1346	143.9853	159.1065	167.3868	185.1223 (64)
Efficiency of water heater												
(217)m	82.7693	82.0682	80.9621	79.9436	79.8051	79.8000	79.8000	79.8000	79.8000	80.0574	81.6063	79.8000 (216)
Fuel for water heating, kWh/month												
	225.8518	201.7054	218.0103	196.1886	191.8810	174.4152	173.2878	179.3666	180.4327	198.7407	205.1150	223.3869 (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												384.8381 (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												2368.3820 (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	2754.8936 (238)

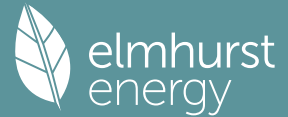
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	384.8381	0.2100	80.8160 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2368.3820	0.2100	497.3602 (264)
Space and water heating			578.1762 (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			580.7270 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.2000 (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	384.8381	1.1300	434.8670 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2368.3820	1.1300	2676.2716 (278)
Space and water heating			3111.1387 (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			3182.5015 (286)
Target Primary Energy Rate (TPER)			72.3300 (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	84 B		DER	11.61		TER	12.49
Environmental	91 B		% DER < TER				7.05
CO ₂ Emissions (t/year)	0.68		DFEE	23.35		TFEE	24.67
Compliance Check	See BREL		% DFEE < TFEE				5.37
% DPER < TPER	-3.78		DPER	70.59		TPER	68.02
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	61.6100 (1b)	2.4000 (2b)	147.8640 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.6100		147.8640 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	147.8640 (5)

2. Ventilation rate

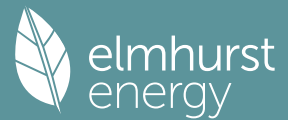
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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							
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)	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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	244.1216	216.1151	229.9242	202.6828	196.8913	147.2716	144.1246	150.7798	153.4671	204.7308	217.1306	241.5024 (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	244.1216	216.1151	229.9242	202.6828	196.8913	147.2716	144.1246	150.7798	153.4671	204.7308	217.1306	241.5024 (64)
12Total per year (kWh/year)												2348.7420 (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	107.3816	95.5329	102.6609	92.7576	91.6775	60.0391	59.3618	61.5747	62.0991	94.2841	97.5616	106.5107 (65)

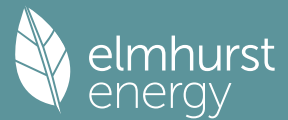
5. Internal gains (see Table 5 and 5a)

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	144.3301	142.1620	137.9851	128.8300	123.2225	83.3877	79.7874	82.7616	86.2488	126.7260	135.5022	143.1595 (72)
	463.9903	473.2235	454.8538	438.8216	417.8010	369.2526	354.8674	356.0051	367.0961	414.4503	438.6395	455.0105 (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				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	499.4576	545.4183	584.9258	652.4373	704.9424	675.3757	641.2393	584.3041	525.5909	502.6781	483.2666	483.9749 (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	0.9859	0.9630	0.8932	0.6953	0.4952	0.3484	0.2523	0.2882	0.4867	0.7661	0.9509	0.9887 (86)
MIT	20.7707	20.8571	20.9476	20.9962	20.9999	21.0000	21.0000	21.0000	20.9999	20.9921	20.9014	20.7595 (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	0.9812	0.9523	0.8701	0.6632	0.4644	0.3175	0.2198	0.2528	0.4464	0.7274	0.9356	0.9848 (89)
MIT 2	20.2048	20.2881	20.3693	20.4170	20.4215	20.4329	20.4329	20.4352	20.4284	20.4170	20.3401	20.2023 (90)
Living area fraction									fLA = Living area / (4) =			0.5038 (91)
MIT	20.4899	20.5748	20.6607	20.7088	20.7129	20.7186	20.7186	20.7198	20.7163	20.7067	20.6229	20.4830 (92)
Temperature adjustment												0.3000
adjusted MIT	20.7899	20.8748	20.9607	21.0088	21.0129	21.0186	21.0186	21.0198	21.0163	21.0067	20.9229	20.7830 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9844	0.9610	0.8918	0.6958	0.4959	0.3494	0.2533	0.2895	0.4878	0.7665	0.9491	0.9874 (94)
Useful gains	491.6552	524.1350	521.6117	453.9358	349.5756	235.9874	162.4559	169.1321	256.4006	385.3168	458.6653	477.8729 (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	639.6119	617.1488	556.4039	456.4959	349.6429	235.9883	162.4560	169.1322	256.4386	390.7082	523.2651	632.9077 (97)
Space heating kWh	110.0798	62.5053	25.8854	1.8433	0.0501	0.0000	0.0000	0.0000	0.0000	4.0112	46.5119	115.3459 (98a)
Space heating requirement - total per year (kWh/year)												366.2328
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	110.0798	62.5053	25.8854	1.8433	0.0501	0.0000	0.0000	0.0000	0.0000	4.0112	46.5119	115.3459 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												366.2328
Space heating per m2										(98c) / (4) =		5.9444 (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 %)													83.9000 (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	110.0798	62.5053	25.8854	1.8433	0.0501	0.0000	0.0000	0.0000	0.0000	4.0112	46.5119	115.3459 (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)	110.0798	62.5053	25.8854	1.8433	0.0501	0.0000	0.0000	0.0000	0.0000	4.0112	46.5119	115.3459 (211)	
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	244.1216	216.1151	229.9242	202.6828	196.8913	147.2716	144.1246	150.7798	153.4671	204.7308	217.1306	241.5024 (64)	
Efficiency of water heater												80.3000 (216)	
(217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000 (217)	
Fuel for water heating, kWh/month	324.1987	287.0055	305.3442	269.1670	261.4759	195.5798	191.4006	200.2388	203.8075	271.8869	288.3541	320.7203 (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	13.0843	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)													
(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												366.2328 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												80.3000	
Water heating fuel used												3119.1792 (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	3787.9714 (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	366.2328	0.1599	58.5447 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3119.1792	0.2100	655.0276 (264)
Space and water heating			713.5724 (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			756.3754 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.2800 (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	366.2328	1.5917	582.9149 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3119.1792	1.1300	3524.6725 (278)
Space and water heating			4107.5874 (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			4568.4228 (286)
Dwelling Primary energy Rate (DPER)			74.1500 (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	61.6100 (1b)	x 2.4000 (2b)	= 147.8640 (1b) - (3b)
Ground floor			
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

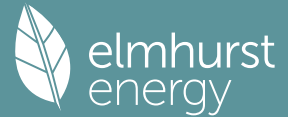
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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						(36a) =	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 28.6507	Feb 28.4856	Mar 28.3237	Apr 27.5633	May 27.4210	Jun 26.7588	Jul 26.7588	Aug 26.6361	Sep 27.0139	Oct 27.4210	Nov 27.7088	Dec 28.0097	(38)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												52.1188	
HLP	Jan 0.8636	Feb 0.8609	Mar 0.8583	Apr 0.8460	May 0.8436	Jun 0.8329	Jul 0.8329	Aug 0.8309	Sep 0.8370	Oct 0.8436	Nov 0.8483	Dec 0.8532	(40)
HLP (average)												0.8459	
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														
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 baths														
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)	
Hot water usage for other uses														
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)	
Average daily hot water use (litres/day)													109.1492	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
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)	
Energy content (annual)										Total = Sum(45)m =		1812.9454		
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													180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8381	(55)
Total storage loss														
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803		(56)	
If cylinder contains dedicated solar storage														
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803		(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		(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														
237.2977	209.9516	223.1002	196.0790	190.0674	171.2438	168.8959	175.5511	177.4393	197.9069	210.5268	234.6784		(62)	
WWHRS	-26.6075	-23.5319	-24.6412	-20.4039	-19.0157	-16.2719	-15.2523	-16.2193	-16.8355	-19.8472	-22.4845		(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														
210.6903	186.4197	198.4590	175.6751	171.0517	154.9719	153.6436	159.3318	160.6038	178.0597	188.0424	208.5637		(64)	
Total per year (kWh/year)													2145.5127	(64)
Electric shower(s)													2146	(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														
101.9224	90.6020	97.2018	87.4746	86.2184	79.2169	79.1788	81.3917	81.2769	88.8250	92.2785	101.0515		(65)	

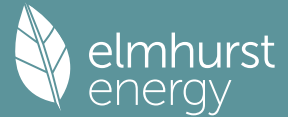
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), 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)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	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)
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)	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	-81.0708	(71)
Water heating gains (Table 5)	136.9925	134.8244	130.6476	121.4925	115.8849	110.0235	106.4232	109.3974	112.8846	119.3884	128.1646	135.8219	(72)
Total internal gains	459.6527	468.8859	450.5162	434.4841	413.4635	395.8884	381.5032	382.6409	393.7319	410.1128	434.3020	450.6730	(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	508.5312	568.3794	629.7718	728.8732	809.1802	817.7643	776.1595	697.2654	612.1575	531.7017	495.8037	490.5896 (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	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	0.9961	0.9891	0.9601	0.8204	0.5945	0.4015	0.2909	0.3377	0.5791	0.9031	0.9876	0.9970 (86)
MIT	20.4695	20.5946	20.7747	20.9545	20.9968	20.9999	21.0000	21.0000	20.9981	20.9159	20.6704	20.4520 (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	0.9945	0.9847	0.9458	0.7802	0.5456	0.3529	0.2397	0.2809	0.5149	0.8661	0.9819	0.9958 (89)
MIT 2	19.5923	19.7518	19.9731	20.1761	20.2137	20.2249	20.2249	20.2266	20.2205	20.1454	19.8572	19.5776 (90)
Living area fraction	20.0342	20.1764	20.3769	20.5683	20.6082	20.6153	20.6154	20.6163	20.6122	20.5336	20.2669	20.0181 (92)
MIT	20.0342	20.1764	20.3769	20.5683	20.6082	20.6153	20.6154	20.6163	20.6122	20.5336	20.2669	20.0181 (93)
Temperature adjustment												0.0000
adjusted MIT	20.0342	20.1764	20.3769	20.5683	20.6082	20.6153	20.6154	20.6163	20.6122	20.5336	20.2669	20.0181 (93)

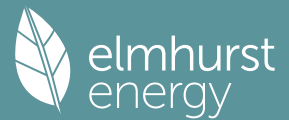
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9941	0.9846	0.9493	0.7989	0.5702	0.3774	0.2655	0.3095	0.5472	0.8823	0.9824	0.9954 (94)
Useful gains	505.5159	559.5994	597.8328	582.3036	461.3911	308.6370	206.0490	215.8342	334.9998	469.0975	487.0575	488.3293 (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	837.1694	810.2856	733.8098	608.1439	463.0230	308.6769	206.0504	215.8396	335.8369	516.3213	688.1671	831.4931 (97)
Space heating kWh	246.7502	168.4611	101.1669	18.6051	1.2141	0.0000	0.0000	0.0000	0.0000	35.1345	144.7990	255.3139 (98a)
Space heating requirement - total per year (kWh/year)												971.4447
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	246.7502	168.4611	101.1669	18.6051	1.2141	0.0000	0.0000	0.0000	0.0000	35.1345	144.7990	255.3139 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												971.4447
Space heating per m2										(98c) / (4) =		15.7676 (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	246.7502	168.4611	101.1669	18.6051	1.2141	0.0000	0.0000	0.0000	0.0000	35.1345	144.7990	255.3139 (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)	267.3350	182.5147	109.6066	20.1572	1.3154	0.0000	0.0000	0.0000	0.0000	38.0656	156.8786	276.6131 (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	210.6903	186.4197	198.4590	175.6751	171.0517	154.9719	153.6436	159.3318	160.6038	178.0597	188.0424	208.5637 (64)
Efficiency of water heater (217)m	84.4150	83.8333	82.6276	80.5821	79.8570	79.8000	79.8000	79.8000	79.8000	81.1555	83.4808	79.8000 (216)
Fuel for water heating, kWh/month	249.5886	222.3695	240.1850	218.0075	214.1974	194.2004	192.5359	199.6639	201.2578	219.4055	225.2522	84.5145 (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	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)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-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)												
(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	-1.3740	-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)												
(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												1052.4862 (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	2623.4426 (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	3634.7876 (238)

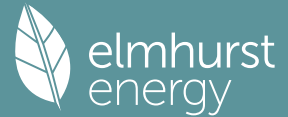
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1052.4862	0.2100	221.0221 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2623.4426	0.2100	550.9229 (264)
Space and water heating			771.9450 (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			769.4446 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.4900 (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	1052.4862	1.1300	1189.3094 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2623.4426	1.1300	2964.4901 (278)
Space and water heating			4153.7995 (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			4190.4742 (286)
Target Primary Energy Rate (TPER)			68.0200 (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	74 C		DER	12.37		TER	14.15	
Environmental	89 B		% DER < TER				12.58	
CO ₂ Emissions (t/year)	0.98		DFEE	39.85		TFEE	39.70	
Compliance Check	See BREL		% DFEE < TFEE				-0.37	
% DPER < TPER	-14.73		DPER	87.85		TPER	76.57	
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	87.0300	2.4000	208.8720
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.0300		
Dwelling volume			

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)

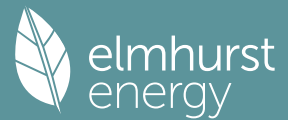
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (21)

	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) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							26433.6894 (34)
List of Thermal Bridges							303.7308 (35)
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	67.2526 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	180.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	0.0500 (48)											
Temperature factor from Table 2b	0.7800 (49)											
Enter (49) or (54) in (55)	0.0390 (55)											
Total storage loss												
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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 (59)
Total heat required for water heating calculated for each month	274.2574	242.6316	257.7834	226.4666	219.4571	167.0754	163.2982	171.0203	174.2651	228.5543	243.2309	271.2185 (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	274.2574	242.6316	257.7834	226.4666	219.4571	167.0754	163.2982	171.0203	174.2651	228.5543	243.2309	271.2185 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2639.2588 (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	117.4017	104.3496	111.9241	100.6658	99.1806	66.6239	65.7370	68.3046	69.0145	102.2054	106.2399	116.3913 (65)

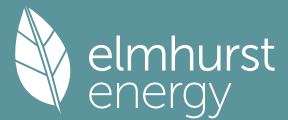
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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	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)	-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)	157.7980	155.2821	150.4356	139.8136	133.3073	92.5332	88.3562	91.8073	95.8534	137.3729	147.5554	156.4399 (72)
Total internal gains	570.8242	583.3504	559.7789	540.0837	513.2425	460.9722	442.5664	443.5944	457.6725	508.2651	538.7825	559.1632 (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	735.3908	866.1927	953.4814	1039.1395	1082.4854	1030.6111	989.8812	937.8567	887.7522	822.6740	736.3551	699.7004 (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	0.9946	0.9841	0.9571	0.8712	0.7101	0.5228	0.3762	0.4137	0.6477	0.9031	0.9848	0.9960 (86)
MIT	20.2086	20.3994	20.6187	20.8519	20.9673	20.9964	20.9997	20.9994	20.9861	20.8374	20.4866	20.1778 (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	0.9926	0.9784	0.9427	0.8351	0.6509	0.4514	0.3000	0.3339	0.5699	0.8663	0.9784	0.9945 (89)
MIT 2	19.3701	19.5591	19.7708	19.9877	20.0762	20.1043	20.1055	20.1077	20.0952	19.9829	19.6559	19.3473 (90)
Living area fraction	19.7457	19.9355	20.1506	20.3748	20.4753	20.5038	20.5060	20.5071	20.4942	20.3656	20.0280	0.4479 (91)
MIT	19.7457	19.9355	20.1506	20.3748	20.4753	20.5038	20.5060	20.5071	20.4942	20.3656	20.0280	19.7193 (92)
Temperature adjustment												0.3000
adjusted MIT	20.0457	20.2355	20.4506	20.6748	20.7753	20.8038	20.8060	20.8071	20.7942	20.6656	20.3280	20.0193 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9926	0.9795	0.9491	0.8591	0.6959	0.5073	0.3597	0.3965	0.6304	0.8907	0.9803	0.9944 (94)
Useful gains	729.9244	848.4697	904.9113	892.7370	753.3456	522.8679	356.0892	371.8745	559.6579	732.7881	721.8704	695.7796 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1382.8473	1343.1550	1218.5241	1014.4001	779.6689	525.5639	356.3132	372.2965	570.3088	864.7486	1142.7598	1374.1835 (97)
Space heating kWh	485.7746	332.4285	233.3279	87.5975	19.5846	0.0000	0.0000	0.0000	0.0000	98.1786	303.0404	504.7325 (98a)
Space heating requirement - total per year (kWh/year)												2064.6646
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	485.7746	332.4285	233.3279	87.5975	19.5846	0.0000	0.0000	0.0000	0.0000	98.1786	303.0404	504.7325 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2064.6646
Space heating per m2										(98c) / (4) =		23.7236 (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 %)												83.9000 (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	485.7746	332.4285	233.3279	87.5975	19.5846	0.0000	0.0000	0.0000	0.0000	98.1786	303.0404	504.7325 (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)	485.7746	332.4285	233.3279	87.5975	19.5846	0.0000	0.0000	0.0000	0.0000	98.1786	303.0404	504.7325 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	274.2574	242.6316	257.7834	226.4666	219.4571	167.0754	163.2982	171.0203	174.2651	228.5543	243.2309	271.2185 (64)
Efficiency of water heater (217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	80.3000 (216)
Fuel for water heating, kWh/month	364.2196	322.2199	342.3418	300.7525	291.4437	221.8797	216.8635	227.1186	231.4277	303.5250	323.0158	360.1839 (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												2064.6646 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												3504.9917 (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	6006.5286	(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	2064.6646	0.1572	324.5634	(261)
Space heating - main system 2	0.0000	0.2100	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3504.9917	0.2100	736.0483	(264)
Space and water heating			1060.6116	(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			1122.4431	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.9000	(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	2064.6646	1.5819	3266.1626	(275)
Space heating - main system 2	0.0000	1.1300	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3504.9917	1.1300	3960.6407	(278)
Space and water heating			7226.8032	(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			7892.3152	(286)
Dwelling Primary energy Rate (DPER)			90.6800	(287)

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

1. Overall dwelling characteristics

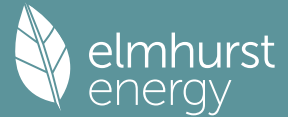
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	87.0300	(1b)	x 2.4000	(2b) = 208.8720 (1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.0300			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.8720 (5)

2. Ventilation rate

		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
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	0.4642	0.4551	0.4460	0.4005	0.3914	0.3459	0.3459	0.3368	0.3641	0.3914	0.4096	0.4278
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

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													
K1 Element				Length	Psi-value		Total						
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						(36a) =	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 41.8914	Feb 41.6029	Mar 41.3202	Apr 39.9924	May 39.7439	Jun 38.5874	Jul 38.5874	Aug 38.3732	Sep 39.0329	Oct 39.7439	Nov 40.2465	Dec 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	Jan 1.2612	Feb 1.2579	Mar 1.2546	Apr 1.2394	May 1.2365	Jun 1.2232	Jul 1.2232	Aug 1.2208	Sep 1.2284	Oct 1.2365	Nov 1.2423	Dec 1.2483	(40)
HLP (average)												1.2394	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

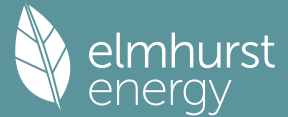
4. Water heating energy requirements (kWh/year)

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)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
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										Total = Sum(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												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(55)
Total storage loss													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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													
267.4335	236.4680	250.9595	219.8628	212.6332	191.0476	188.0695	195.7916	198.2373	221.7304	236.6271	264.3946	(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													
236.5636	209.1665	222.3708	196.1903	190.5712	172.1691	170.3738	176.9740	178.7048	198.7037	210.5407	234.0963	(64)	
12Total per year (kWh/year)												2396.4249	(64)
Electric shower(s)												2396	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
111.9426	99.4187	106.4650	95.3827	93.7215	85.8017	85.5540	88.1216	88.1922	96.7463	100.9568	110.9321	(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	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	150.4604	147.9445	143.0981	132.4760	125.9697	119.1690	114.9920	118.4431	122.4892	130.0353	140.2178	149.1023 (72)
	566.4867	579.0128	555.4413	535.7461	508.9049	487.6080	469.2022	470.2302	484.3083	503.9276	534.4449	554.8256 (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					2.9700	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	788.0153	959.7597	1085.4314	1207.5744	1275.2323	1254.4742	1206.0126	1135.6105	1063.2731	927.1702	800.4046	744.0071 (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	0.9943	0.9833	0.9566	0.8780	0.7295	0.5348	0.3872	0.4282	0.6634	0.9148	0.9854	0.9958 (86)
MIT	19.9138	20.1522	20.4354	20.7456	20.9267	20.9892	20.9985	20.9974	20.9664	20.7184	20.2588	19.8756 (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	0.9921	0.9771	0.9409	0.8390	0.6610	0.4471	0.2912	0.3273	0.5706	0.8774	0.9789	0.9941 (89)
MIT 2	18.6398	18.9420	19.2926	19.6594	19.8396	19.8967	19.9011	19.9028	19.8799	19.6424	19.0886	18.5987 (90)
Living area fraction									fLA = Living area / (4) =			0.4479 (91)
MIT	19.2104	19.4840	19.8044	20.1459	20.3265	20.3860	20.3926	20.3931	20.3665	20.1244	19.6127	19.1706 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2104	19.4840	19.8044	20.1459	20.3265	20.3860	20.3926	20.3931	20.3665	20.1244	19.6127	19.1706 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9903	0.9744	0.9398	0.8490	0.6891	0.4863	0.3343	0.3726	0.6115	0.8864	0.9768	0.9926	(94)
Useful gains	780.3910	935.2086	1020.0383	1025.1760	878.7673	610.0696	403.1711	423.1761	650.1411	821.8329	781.8374	738.5291	(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	1636.6098	1596.5748	1452.7350	1213.0251	928.3416	615.9714	403.7586	424.2410	669.9200	1024.9686	1352.8506	1626.4557	(97)
Space heating kWh	637.0268	444.4381	321.9264	135.2514	36.8833	0.0000	0.0000	0.0000	0.0000	151.1329	411.1295	660.6174	(98a)
Space heating requirement - total per year (kWh/year)												2798.4058	
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	637.0268	444.4381	321.9264	135.2514	36.8833	0.0000	0.0000	0.0000	0.0000	151.1329	411.1295	660.6174	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2798.4058	
Space heating per m2										(98c) / (4) =		32.1545	(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	637.0268	444.4381	321.9264	135.2514	36.8833	0.0000	0.0000	0.0000	0.0000	151.1329	411.1295	660.6174 (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)	690.1698	481.5147	348.7826	146.5345	39.9603	0.0000	0.0000	0.0000	0.0000	163.7410	445.4274	715.7285 (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	236.5636	209.1665	222.3708	196.1903	190.5712	172.1691	170.3738	176.9740	178.7048	198.7037	210.5407	234.0963 (64)
Efficiency of water heater	86.1684	85.7066	84.8886	83.2428	81.1334	79.8000	79.8000	79.8000	79.8000	83.4540	85.5330	79.8000 (216)
Fuel for water heating, kWh/month	274.5365	244.0493	261.9560	235.6844	234.8862	215.7507	213.5010	221.7720	223.9409	238.0996	246.1514	271.4012 (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												3031.8589 (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												2881.7293 (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												5806.0279 (238)

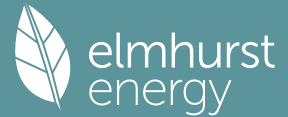
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3031.8589	0.2100	636.6904 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2881.7293	0.2100	605.1632 (264)
Space and water heating			1241.8535 (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			1231.4023 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.1500 (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	3031.8589	1.1300	3426.0005 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2881.7293	1.1300	3256.3541 (278)
Space and water heating			6682.3547 (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			6663.9610 (286)
Target Primary Energy Rate (TPER)			76.5700 (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	78 C	DER	15.42	TER	17.28	
Environmental	90 B	% DER < TER				10.76
CO ₂ Emissions (t/year)	0.69	DFEE	39.31	TFEE	40.03	
Compliance Check	See BREL	% DFEE < TFEE				1.78
% DPER < TPER	-7.03	DPER	100.74	TPER	94.12	
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	47.7700 (1b)	2.4000 (2b)	114.6480 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.7700		114.6480 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 114.6480 (5)

2. Ventilation rate

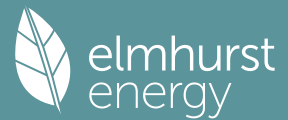
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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 (32a)
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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss												
	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage												
	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
	222.3319	196.9424	209.7805	185.4858	180.5751	132.9524	130.2612	136.1449	138.4290	187.5052	198.2588	220.0161 (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												
	222.3319	196.9424	209.7805	185.4858	180.5751	132.9524	130.2612	136.1449	138.4290	187.5052	198.2588	220.0161 (64)
12Total per year (kWh/year)												2138.6831 (64)
Electric shower(s)												2139 (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												
	100.1365	89.1579	95.9632	87.0396	86.2524	55.2780	54.7522	56.7085	57.0990	88.5566	91.2867	99.3665 (65)

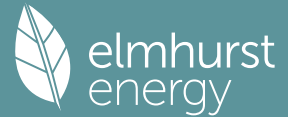
5. Internal gains (see Table 5 and 5a)												

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	134.5921	132.6755	128.9827	120.8884	115.9306	76.7750	73.5917	76.2212	79.3041	119.0277	126.7870	133.5571 (72)
	394.7502	401.9452	386.9100	373.3196	356.0441	309.9248	298.1224	299.2841	308.4439	353.6635	373.7405	387.4743 (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											
Southeast	5.0625											41.3070 (77)
West	6.3000											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 463.4964 525.9831 571.5791 621.5275 647.6531 604.3087 579.9884 548.7496 515.4958 495.1195 457.4302 445.3891 (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	0.9913	0.9777	0.9417	0.8306	0.6519	0.4814	0.3455	0.3807	0.6068	0.8675	0.9759	0.9933 (86)
MIT	20.4091	20.5624	20.7446	20.9210	20.9874	20.9989	20.9999	20.9998	20.9943	20.9086	20.6410	20.3835 (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	0.9880	0.9696	0.9224	0.7885	0.5940	0.4159	0.2766	0.3083	0.5323	0.8223	0.9656	0.9906 (89)
MIT 2	19.5780	19.7282	19.8999	20.0578	20.1053	20.1219	20.1222	20.1244	20.1159	20.0540	19.8148	19.5601 (90)
Living area fraction	fLA = Living area / (4) = 0.6416 (91)											
MIT	20.1113	20.2634	20.4418	20.6116	20.6713	20.6846	20.6854	20.6861	20.6795	20.6024	20.3449	20.0884 (92)
Temperature adjustment	0.3000											
adjusted MIT	20.4113	20.5634	20.7418	20.9116	20.9713	20.9846	20.9854	20.9861	20.9795	20.9024	20.6449	20.3884 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9893	0.9741	0.9367	0.8267	0.6501	0.4802	0.3443	0.3795	0.6051	0.8630	0.9722	0.9916 (94)
Useful gains	458.5265	512.3832	535.4213	513.8293	421.0532	290.1987	199.7065	208.2516	311.9144	427.2955	444.7329	441.6274 (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	759.1093	736.1191	667.5933	555.8082	427.8865	290.8106	199.7492	208.3379	315.0116	475.4733	628.3898	754.9347 (97)
Space heating kWh	223.6337	150.3505	98.3360	30.2248	5.0840	0.0000	0.0000	0.0000	0.0000	35.8443	132.2330	233.1007 (98a)
Space heating requirement - total per year (kWh/year)	908.8069											
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	223.6337	150.3505	98.3360	30.2248	5.0840	0.0000	0.0000	0.0000	0.0000	35.8443	132.2330	233.1007 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	908.8069											
Space heating per m2	(98c) / (4) = 19.0246 (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 %)

83.9000 (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	223.6337	150.3505	98.3360	30.2248	5.0840	0.0000	0.0000	0.0000	0.0000	35.8443	132.2330	233.1007 (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)	223.6337	150.3505	98.3360	30.2248	5.0840	0.0000	0.0000	0.0000	0.0000	35.8443	132.2330	233.1007 (211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000 (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	222.3319	196.9424	209.7805	185.4858	180.5751	132.9524	130.2612	136.1449	138.4290	187.5052	198.2588	220.0161 (64)
Efficiency of water heater (217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	80.3000 (216)
Fuel for water heating, kWh/month	295.2615	261.5436	278.5930	246.3291	239.8076	176.5636	172.9896	180.8033	183.8366	249.0109	263.2919	292.1860 (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	908.8069 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	80.3000											
Water heating fuel used	2840.2167 (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	3987.4055 (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	908.8069	0.1578	143.3844 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	2840.2167	0.2100	596.4455 (264)
Space and water heating			739.8299 (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			773.5427 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			16.1900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	908.8069	1.5840	1439.5864 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (277)
Water heating (other fuel)	2840.2167	1.1300	3209.4448 (278)
Space and water heating			4649.0312 (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			5012.0747 (286)
Dwelling Primary energy Rate (DPER)			104.9200 (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)								(32)
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)

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)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9196	22.7642	22.6119	21.8963	21.7624	21.1391	21.1391	21.0237	21.3792	21.7624	22.0332	22.3164
Average = Sum(39)m / 12 =	60.1847	60.0293	59.8770	59.1614	59.0275	58.4042	58.4042	58.2888	58.6443	59.0275	59.2983	59.5815

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2599	1.2566	1.2534	1.2385	1.2357	1.2226	1.2226	1.2202	1.2276	1.2357	1.2413	1.2473
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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for baths	51.4603	50.6870	49.5600	47.4039	45.8127	44.0382	43.0296	44.1480	45.3740	47.2792	49.4817	51.2631
Hot water usage for other uses	22.2528	21.9224	21.4570	20.5989	19.9563	19.2439	18.8590	19.3212	19.8243	20.5867	21.4625	22.1776
Average daily hot water use (litres/day)	31.2685	30.1315	28.9945	27.8574	26.7204	25.5833	25.5833	26.7204	27.8574	28.9945	30.1315	31.2685

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
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
Energy content (annual)												
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

Water storage loss:

Store volume

180.0000 (47)

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

Temperature factor from Table 2b

1.5520 (48)

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

0.5400 (49)

Total storage loss

0.8381 (55)

If cylinder contains dedicated solar storage

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Primary loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803
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

Total heat required for water heating calculated for each month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WWHRS	215.5080	190.7788	202.9566	178.8820	173.7512	156.9246	155.0324	160.9161	162.4012	180.6813	191.6550	213.1921
PV diverter	-23.5255	-20.8061	-21.7870	-18.0405	-16.8131	-14.3871	-13.4856	-14.3406	-14.8854	-17.5483	-19.8801	-23.0898
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Output from w/h

191.9825 169.9727 181.1696 160.8415 156.9381 142.5375 141.5468 146.5756 147.5158 163.1330 171.7749 190.1023

12Total per year (kWh/year)

Total per year (kWh/year) = Sum(64)m = 1964.0901 (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

Heat gains from water heating, kWh/month

94.6774 84.2271 90.5040 81.7566 80.7932 74.4558 74.5692 76.5256 76.2767 83.0975 86.0036 93.9073 (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

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

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

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

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

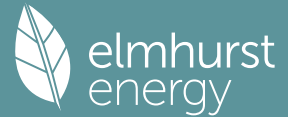
Losses e.g. evaporation (negative values) (Table 5)

-64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879 -64.9879

Water heating gains (Table 5)

127.2545 125.3379 121.6452 113.5508 108.5930 103.4108 100.2275 102.8569 105.9399 111.6902 119.4495 126.2195

Full SAP Calculation Printout



Total internal gains
390.4127 397.6077 382.5724 368.9821 351.7065 336.5605 324.7582 325.9199 335.0797 349.3259 369.4030 383.1368 (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	485.1535	568.5474	637.0696	711.0436	753.5803	742.2585	713.2048	669.7146	620.4230	544.2700 484.7378 462.9506 (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	0.9931	0.9821	0.9526	0.8606	0.6958	0.4997	0.3599	0.3995	0.6344	0.9041	0.9827	0.9947 (86)
MIT	20.0919	20.2915	20.5460	20.8191	20.9571	20.9950	20.9994	20.9989	20.9808	20.7879	20.3947	20.0604 (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	0.9903	0.9750	0.9346	0.8166	0.6252	0.4160	0.2703	0.3048	0.5415	0.8612	0.9745	0.9924 (89)
MIT 2	18.8552	19.1072	19.4192	19.7342	19.8638	19.9000	19.9018	19.9037	19.8889	19.7135	19.2488	18.8229 (90)
Living area fraction	fLA = Living area / (4) =											0.6416 (91)
MIT	19.6487	19.8670	20.1422	20.4303	20.5653	20.6026	20.6061	20.6064	20.5895	20.4028	19.9840	19.6169 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6487	19.8670	20.1422	20.4303	20.5653	20.6026	20.6061	20.6064	20.5895	20.4028	19.9840	19.6169 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9896	0.9749	0.9394	0.8393	0.6690	0.4697	0.3278	0.3656	0.6008	0.8828	0.9753	0.9918 (94)
Useful gains	480.0840	554.2837	598.4444	596.8132	504.1637	348.6536	233.7952	244.8496	372.7647	480.5063	472.7823	459.1403 (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	923.7587	898.4613	816.8526	682.1478	523.2958	350.5757	233.9715	245.1867	380.5701	578.6365	764.0007	918.5623 (97)
Space heating kWh	330.0940	231.2873	162.4957	61.4409	14.2343	0.0000	0.0000	0.0000	0.0000	73.0089	209.6773	341.8099 (98a)
Space heating requirement - total per year (kWh/year)												1424.0483
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	330.0940	231.2873	162.4957	61.4409	14.2343	0.0000	0.0000	0.0000	0.0000	73.0089	209.6773	341.8099 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1424.0483
Space heating per m2												(98c) / (4) = 29.8105 (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	330.0940	231.2873	162.4957	61.4409	14.2343	0.0000	0.0000	0.0000	0.0000	73.0089	209.6773	341.8099 (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)	357.6317	250.5822	176.0517	66.5665	15.4218	0.0000	0.0000	0.0000	0.0000	79.0996	227.1693	370.3250 (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	191.9825	169.9727	181.1696	160.8415	156.9381	142.5375	141.5468	146.5756	147.5158	163.1330	171.7749	190.1023 (64)
Efficiency of water heater	85.2638	84.7511	83.8167	82.1000	80.4783	79.8000	79.8000	79.8000	79.8000	82.3814	84.5080	79.8000 (216)
Fuel for water heating, kWh/month	225.1629	200.5551	216.1498	195.9093	195.0068	178.6184	177.3770	183.6786	184.8568	198.0215	203.2646	85.3594 (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	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													1542.8476	(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													2381.3090	(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													3915.1415	(238)

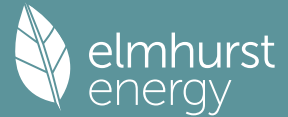
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1542.8476	0.2100	323.9980 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2381.3090	0.2100	500.0749 (264)
Space and water heating			824.0729 (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			825.3224 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.2800 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1542.8476	1.1300	1743.4178 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2381.3090	1.1300	2690.8792 (278)
Space and water heating			4434.2970 (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			4495.8880 (286)
Target Primary Energy Rate (TPER)			94.1200 (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	80 C		DER	12.22		TER	13.39	
Environmental	90 B		% DER < TER				8.74	
CO ₂ Emissions (t/year)	0.79		DFEE	31.20		TFEE	31.22	
Compliance Check	See BREL		% DFEE < TFEE				0.06	
% DPER < TPER	-10.14		DPER	80.12		TPER	72.75	
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	69.6300 (1b)	2.4000 (2b)	167.1120 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.6300		167.1120 (4)
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	

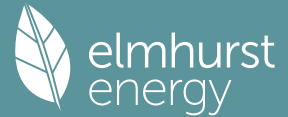
Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	16.9060	16.7302	16.5544	15.6755	15.4997	14.6208	14.6208	14.4451	14.9724	15.4997	15.8513	16.2029 (38)
Average = Sum(39)m / 12 =	58.1114	57.9357	57.7599	56.8810	56.7052	55.8263	55.8263	55.6505	56.1779	56.7052	57.0568	57.4083 (39)
												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 mont	31	28	31	30	31	30	31	31	30	31	30	31

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 content (annual)	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)
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												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0500 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												0.0390 (55)
Total storage loss	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (56)
If cylinder contains dedicated solar storage	1.2090	1.0920	1.2090	1.1700	1.2090	1.1700	1.2090	1.2090	1.1700	1.2090	1.1700	1.2090 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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	255.5206	226.1451	240.4620	211.6791	205.4269	154.7625	151.3771	158.4358	161.3340	213.7421	227.0032	252.7426 (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	255.5206	226.1451	240.4620	211.6791	205.4269	154.7625	151.3771	158.4358	161.3340	213.7421	227.0032	252.7426 (64)
12Total per year (kWh/year)												2458.6311 (64a)
Electric shower(s)												2459 (64a)
	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												0.0000 (64a)
	111.1717	98.8678	106.1648	95.7489	94.5156	62.5299	61.7733	64.1203	64.7149	97.2804	100.8442	110.2481 (65)

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)	149.4244	147.1247	142.6946	132.9846	127.0371	86.8470	83.0286	86.1832	89.8818	130.7532	140.0613	148.1829 (72)
Total internal gains	501.4903	511.8445	491.6623	474.3198	451.2660	401.4050	385.6169	386.7331	398.8709	447.3749	473.7893	491.5817 (73)

[Jan																				
					Area	Solar flux		g		FF	Access						Gains			
					m2	Table 6a		Specific data			factor						W			
						W/m2		or Table 6b			Table 6d									
Southwest					9.1125	36.7938		0.4000		0.8000	0.7700						74.3525 (79)			
West					6.0750	19.6403		0.4000		0.8000	0.7700						26.4592 (80)			
Solar gains	100.8117	178.4097	258.5289	339.0311	392.8530	394.7214	378.6717	338.4976	286.7730	201.3925	122.0487					85.3890 (83)				
Total gains	602.3021	690.2542	750.1912	813.3508	844.1190	796.1264	764.2886	725.2307	685.6439	648.7674	595.8380					576.9708 (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	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	0.9862	0.9655	0.9182	0.7929	0.6164	0.4480	0.3213	0.3529	0.5613	0.8316	0.9639	0.9892 (86)	
MIT	20.4246	20.5928	20.7725	20.9336	20.9893	20.9991	20.9999	20.9999	20.9957	20.9230	20.6647	20.3971 (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	0.9822	0.9562	0.8984	0.7560	0.5691	0.3960	0.2667	0.2957	0.5019	0.7908	0.9525	0.9860 (89)	
MIT 2	19.7133	19.8771	20.0459	20.1926	20.2349	20.2515	20.2518	20.2540	20.2456	20.1893	19.9576	19.6939 (90)	
Living area fraction									fLA = Living area / (4) =				0.5347 (91)
MIT	20.0936	20.2598	20.4344	20.5888	20.6382	20.6512	20.6518	20.6528	20.6467	20.5816	20.3357	20.0699 (92)	
Temperature adjustment												0.3000	
adjusted MIT	20.3936	20.5598	20.7344	20.8888	20.9382	20.9512	20.9518	20.9528	20.9467	20.8816	20.6357	20.3699 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9832	0.9605	0.9119	0.7878	0.6127	0.4447	0.3178	0.3492	0.5571	0.8257	0.9589	0.9866 (94)
Useful gains	592.1549	662.9761	684.0623	640.7487	517.1584	354.0036	242.9045	253.2858	381.9892	535.6837	571.3349	569.2532 (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	935.2239	907.2590	822.1781	681.9328	523.8554	354.5640	242.9455	253.3650	384.6303	583.0201	772.3030	928.2878 (97)
Space heating kWh	255.2434	164.1581	102.7582	29.6526	4.9825	0.0000	0.0000	0.0000	0.0000	35.2183	144.6970	267.1218 (98a)
Space heating requirement - total per year (kWh/year)												1003.8319
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	255.2434	164.1581	102.7582	29.6526	4.9825	0.0000	0.0000	0.0000	0.0000	35.2183	144.6970	267.1218 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1003.8319
Space heating per m2										(98c) / (4) =		14.4167 (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 %)													83.9000 (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	255.2434	164.1581	102.7582	29.6526	4.9825	0.0000	0.0000	0.0000	0.0000	35.2183	144.6970	267.1218	(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)	255.2434	164.1581	102.7582	29.6526	4.9825	0.0000	0.0000	0.0000	0.0000	35.2183	144.6970	267.1218	(211)
Space heating efficiency (main heating system 2)	83.9000	83.9000	83.9000	83.9000	83.9000	0.0000	0.0000	0.0000	0.0000	83.9000	83.9000	83.9000	(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													(213)
Water heating													
Water heating requirement	255.5206	226.1451	240.4620	211.6791	205.4269	154.7625	151.3771	158.4358	161.3340	213.7421	227.0032	252.7426	(64)
Efficiency of water heater													80.3000 (216)
(217)m	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	75.3000	(217)
Fuel for water heating, kWh/month	339.3368	300.3255	319.3387	281.1143	272.8113	205.5278	201.0320	210.4062	214.2550	283.8541	301.4650	335.6476	(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													1003.8319 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													3265.1143 (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	4615.6126	(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	1003.8319	0.1581	158.6698 (261)
Space heating - main system 2	0.0000	0.2100	0.0000 (262)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	3265.1143	0.2100	685.6740 (264)
Space and water heating			844.3438 (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			893.4002 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.8300 (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	1003.8319	1.5851	1591.1757 (275)
Space heating - main system 2	0.0000	1.1300	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3265.1143	1.1300	3689.5792 (278)
Space and water heating			5280.7549 (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			5808.8212 (286)
Dwelling Primary energy Rate (DPER)			83.4200 (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

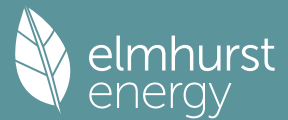
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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													
K1 Element								Length		Psi-value		Total	
E2 Other lintels (including other steel lintels)								6.7500		0.0500		0.3375	
E4 Jamb								22.5000		0.0500		1.1250	
E7 Party floor between dwellings (in blocks of flats)								15.0500		0.0700		1.0535	
E15 Flat roof with parapet								15.0500		0.5600		8.4280	
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)								18.7500		0.0000		0.0000	
P4 Party wall - Roof (insulation at ceiling level)								18.7500		0.1200		2.2500	
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)
Average = Sum(39)m / 12 =	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)
												73.3968	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	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)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

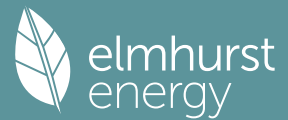
4. Water heating energy requirements (kWh/year)													

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)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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													
	248.6967	219.9815	233.6381	205.0753	198.6030	178.7347	176.1484	183.2071	185.3062	206.9182	220.3994	245.9187	(62)
WWHRS	-28.2197	-24.9578	-26.1343	-21.6403	-20.1679	-17.2579	-16.1765	-17.2021	-17.8556	-21.0498	-23.8469	-27.6971	(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	220.4769	195.0238	207.5038	183.4350	178.4350	161.4768	159.9719	166.0050	167.4506	185.8684	196.5525	218.2215	(64)
													Total per year (kWh/year) = Sum(64)m = 2240.4212 (64)
12Total per year (kWh/year)													2240 (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													
	105.7126	93.9370	100.7056	90.4659	89.0564	81.7076	81.5903	83.9373	83.8926	91.8213	95.5611	104.7889	(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)
	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													
	99.1418	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	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)													
	-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)													
	142.0868	139.7872	135.3570	125.6470	119.6995	113.4828	109.6644	112.8190	116.5176	123.4157	132.7238	140.8453	(72)
Total internal gains													
	497.2172	507.5783	487.3892	470.0488	446.9929	428.1074	412.3171	413.4334	425.5733	443.1018	469.5183	487.3086	(73)

Full SAP Calculation Printout



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
Southwest					9.1125	36.7938	0.6300	0.7000		0.7700	102.4671 (79)
West					6.0750	19.6403	0.6300	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	277.5440	117.6768 (83)
Total gains	636.1484	753.4491	843.6744	937.2760	988.3935	972.0828	934.1740	879.9253	820.7823	720.6458	604.9854 (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	0.9891	0.9722	0.9328	0.8280	0.6619	0.4743	0.3413	0.3778	0.5978	0.8747	0.9739	0.9915 (86)
MIT	20.0978	20.3185	20.5764	20.8353	20.9603	20.9951	20.9994	20.9989	20.9826	20.8067	20.4103	20.0587 (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	0.9855	0.9637	0.9139	0.7880	0.6027	0.4054	0.2678	0.3003	0.5213	0.8339	0.9645	0.9887 (89)
MIT 2	18.9998	19.2769	19.5910	19.8895	20.0116	20.0460	20.0482	20.0496	20.0356	19.8694	19.4023	18.9566 (90)
Living area fraction	19.5869	19.8338	20.1179	20.3952	20.5189	20.5535	20.5568	20.5572	20.5420	20.3705	19.9413	19.5459 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5869	19.8338	20.1179	20.3952	20.5189	20.5535	20.5568	20.5572	20.5420	20.3705	19.9413	19.5459 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9835	0.9618	0.9158	0.8036	0.6329	0.4422	0.3071	0.3418	0.5617	0.8491	0.9633	0.9870 (94)
Useful gains	625.6712	724.6427	772.6408	753.2303	625.5160	429.8130	286.8966	300.7282	461.0717	611.9251	614.3357	597.1015 (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	1139.3186	1110.4370	1010.2930	843.7188	645.9770	431.9850	287.1073	301.1165	469.1408	715.6877	944.4613	1133.4777 (97)
Space heating kWh	382.1537	259.2537	176.8133	65.1517	15.2230	0.0000	0.0000	0.0000	0.0000	77.1994	237.6904	399.0639 (98a)
Space heating requirement - total per year (kWh/year)												1612.5491
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	382.1537	259.2537	176.8133	65.1517	15.2230	0.0000	0.0000	0.0000	0.0000	77.1994	237.6904	399.0639 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1612.5491
Space heating per m2										(98c) / (4) =		23.1588 (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	382.1537	259.2537	176.8133	65.1517	15.2230	0.0000	0.0000	0.0000	0.0000	77.1994	237.6904	399.0639 (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)	414.0343	280.8816	191.5637	70.5869	16.4929	0.0000	0.0000	0.0000	0.0000	83.6397	257.5194	432.3553 (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	220.4769	195.0238	207.5038	183.4350	178.4350	161.4768	159.9719	166.0050	167.4506	185.8684	196.5525	218.2215 (64)
Efficiency of water heater (217)m	85.2811	84.6991	83.7030	81.9776	80.4409	79.8000	79.8000	79.8000	79.8000	82.2462	84.4870	79.8000 (216)
Fuel for water heating, kWh/month	258.5296	230.2550	247.9049	223.7625	221.8214	202.3519	200.4660	208.0264	209.8378	225.9902	232.6421	255.5429 (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	20.5997	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	1747.0738 (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	2717.1307 (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	4403.5799 (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	1747.0738	0.2100	366.8855 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2717.1307	0.2100	570.5974 (264)
Space and water heating			937.4829 (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			932.6852 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.3900 (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	1747.0738	1.1300	1974.1934 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2717.1307	1.1300	3070.3577 (278)
Space and water heating			5044.5511 (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			5065.7294 (286)
Target Primary Energy Rate (TPER)			72.7500 (287)